

# **Chemical, Physical and Biological Characterization of Devils Lake 1995 -2008**

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**North Dakota Department of Health  
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Chemical, Physical and Biological  
Characterization of Devils Lake  
1995-2008

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### Acknowledgements

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## 1.0 Introduction

The Devils Lake Basin is comprised of 2.4 million acres in northeastern North Dakota (Figure 1). The watershed is located in the Northern Glaciated Plains ecoregion and is an undulating mix of integrated and nonintegrated drainage patterns. Streams within the basin are primarily intermittent. The Devils Lake chain, consisting of several bays and East Devils Lake, is located in southern Ramsey and northern Benson counties of North Dakota.

Two primary drainages within the basin are Channel A and Big Coulee (Mauvais Coulee). Channel A drains the Dry Lake, Edmore, Starkweather and Sweetwater areas, while Big Coulee drains Lake Irving, Lake Alice, Chain of Lakes and Mauvais Coulee (Figure 1). Spring runoff is the major source of water. Most runoff enters the system through West Bay (naturally) and Six Mile Bay (Channel A). According to the U.S. Geological Survey (USGS), about 80 percent of the water contributed to Devils Lake enters through these two sources (Greg Wiche, personal communication). Groundwater also contributes to the hydrologic budget. As a result, Devils Lake is susceptible to widely fluctuating lake levels.

Since water levels for Devils Lake were first recorded in 1860, there have been tremendous variations in the surface elevation (Figure 2 and 3). Currently, Devils Lake covers an area of approximately 140,000 acres. Fluctuating water levels are primarily related to the closed-basin nature of the system. The absence of a surface outlet and the fact that annual evaporation frequently exceeds annual precipitation are important causes of the high total dissolved solids (TDS) concentrations. Water level changes have also caused changes in nutrients concentrations.

Variations of TDS and nutrient concentrations are identified as important variables affecting water quality and the aquatic community structure in Devils Lake. High concentrations of TDS affect fish reproduction, fish growth and algal blooms. Furthermore, high nutrient concentrations result in a lake classification of hypereutrophic (nutrient-rich) evidenced by low-light transparency and frequent, prolific, nuisance algal blooms. These algal blooms are dominated by cyanophyta (blue-green algae) and result in impaired water-based recreation.

## 2.0 Methods

Currently, seven sites are sampled each year across the Devils Lake chain of lakes. The sites and their locations are listed in Table 1 and shown in Figure 4. Sampling began at the Pelican Lake site in 1999 and the SW West Bay site in 1997. Sampling was initiated at the remaining five sites in 1995. Sites are typically sampled four times annually, once in each of the following months: February (under ice cover), May, August and October. In 2008, samples were collected the following days: February 26-27, May 20-21, August 18-19 and October 20-21. At various times in the past, there were more sites sampled and/or more frequent sampling, but this report will address only those sites currently active in the Devils Lake sampling program.

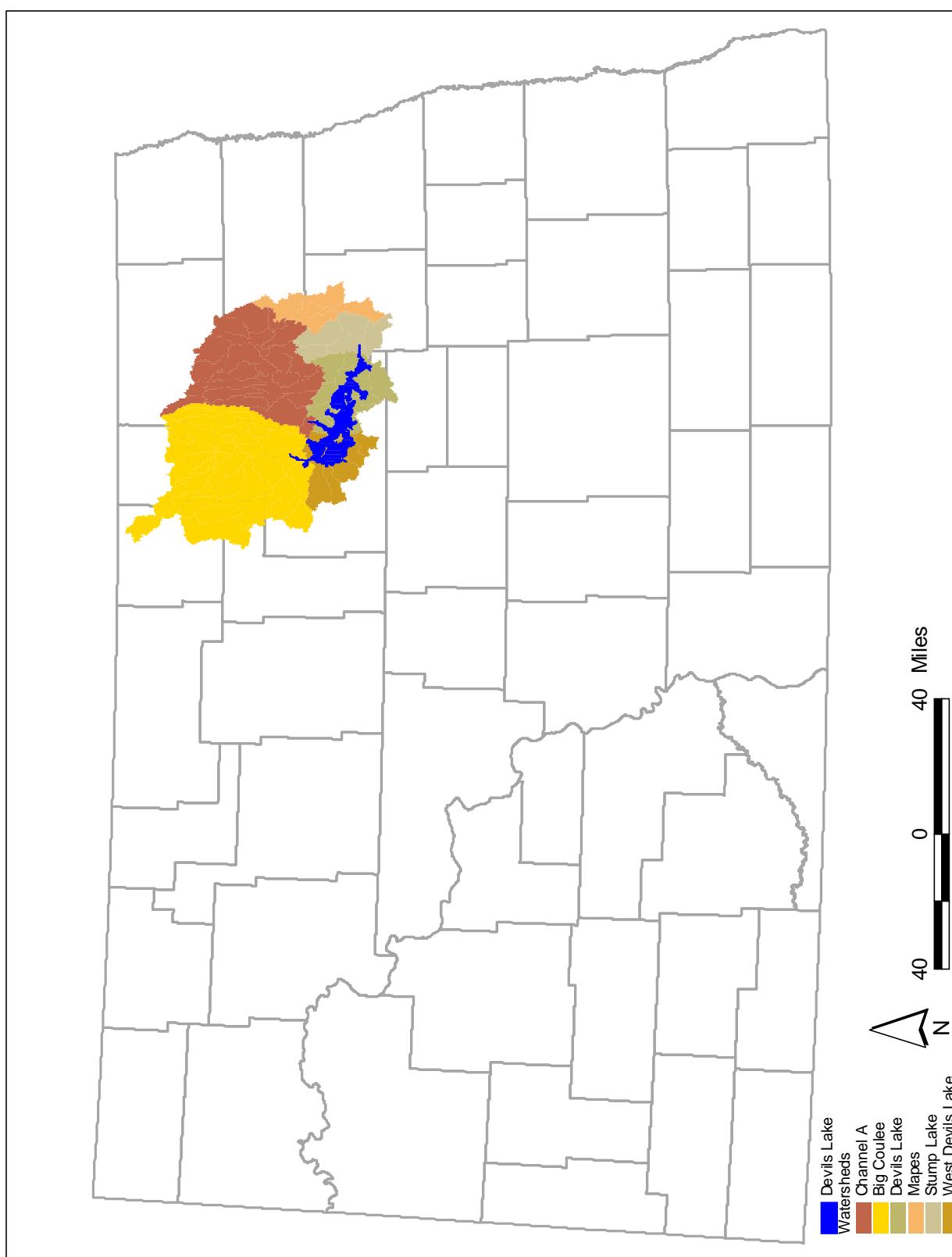


Figure 1. Major Subwatersheds within the Devils lake Basin.

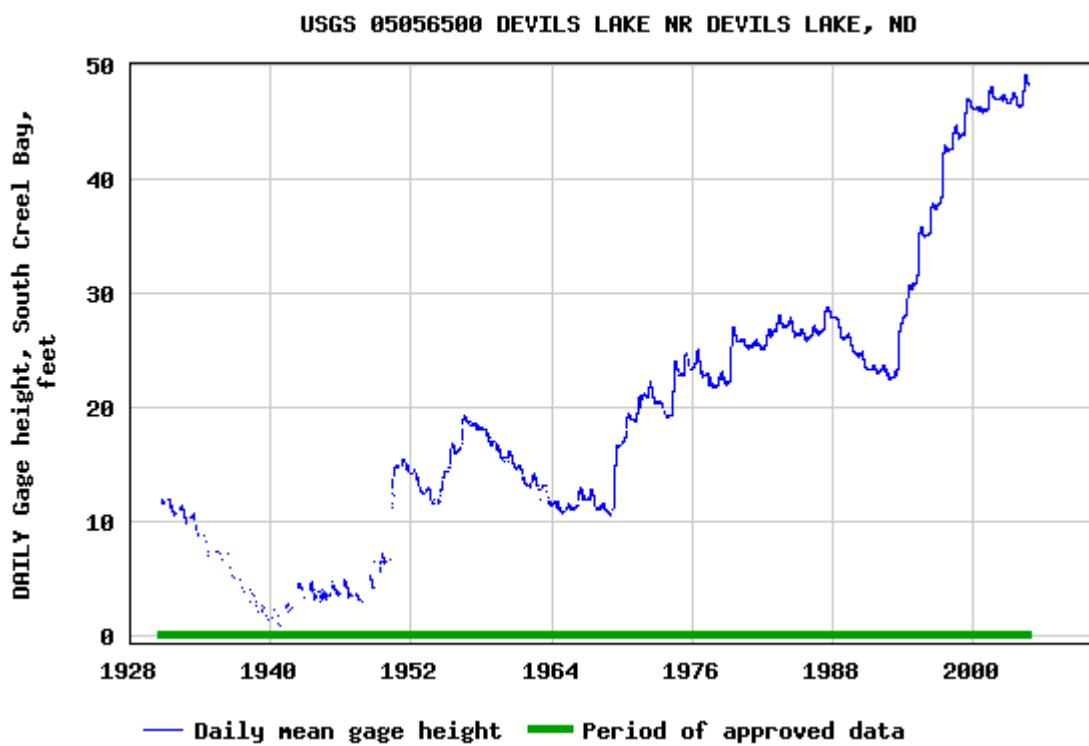


Figure 2. Average Daily Elevation of Devils Lake at USGS Station 05056500 near Devils Lake.

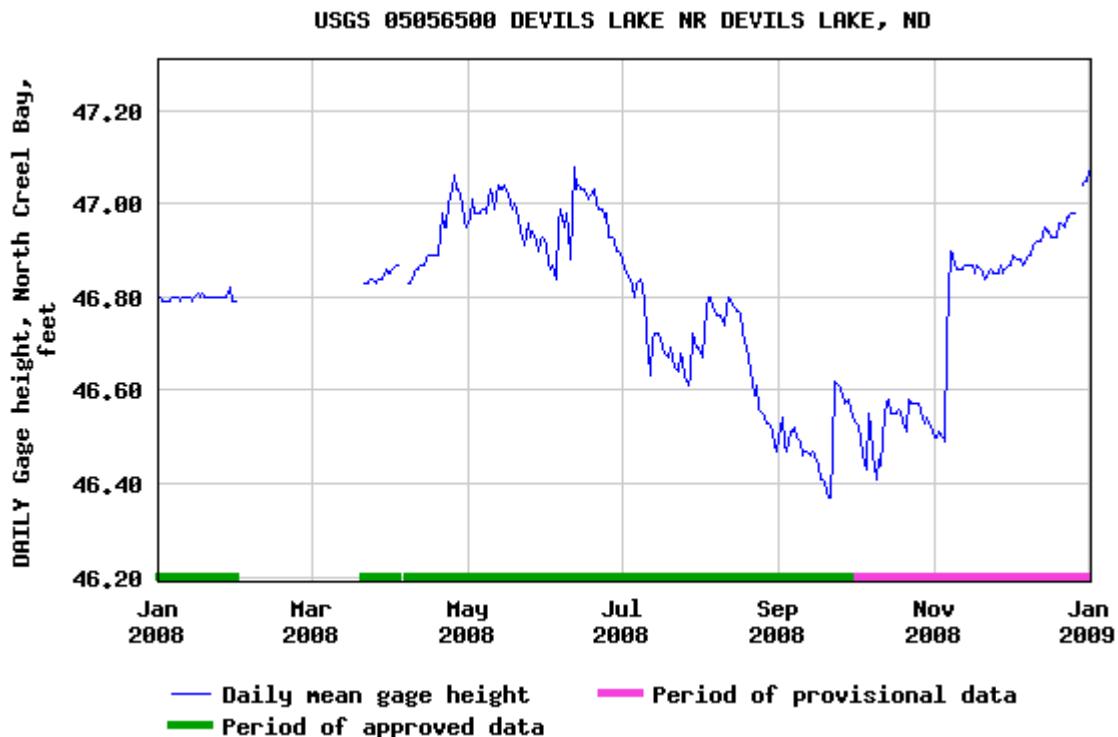


Figure 3. January 1, 2008 through January 1, 2009 average Daily Elevation of Devils Lake at USGS Station 05056500 near Devils Lake.

**Table 1.** Devils Lake Water Quality Monitoring Locations.

STORET ID	Site Description	Latitude	Longitude
380221	Devils Lake - Six Mile Bay	48.10530	-99.02549
380233	Devils Lake - Main Bay	48.03265	-98.95333
380234	Devils Lake - East Bay	48.05927	-98.84115
380235	East Devils Lake	47.95486	-98.64633
380236	Devils Lake - West Bay	48.01335	-99.11192
384160	Devils Lake - SW West Bay	48.04898	-99.21235
385029	Pelican Lake	48.14634	-99.16399

Physical, chemical and biological variables are sampled at each site and consist of the following: chlorophyll-a; phytoplankton; ammonia as nitrogen (N); total Kjeldahl nitrogen as N; nitrate-nitrite as N; total Phosphorus as P (TP); dissolved phosphorus (DP); TDS; major cations/anions; and trace elements. In addition temperature, dissolved oxygen (DO), pH and specific conductivity profiles were recorded at 1-meter intervals. Chlorophyll-a and phytoplankton are collected as a composite sample of the top 2 meters of the water column. The remaining chemical variables are analyzed from two discrete samples collected at about 1 meter below the surface and 1 meter above the bottom. A mid-column sample is collected at the center of the water column or just below the thermocline, if present, for sites greater than 4 meters in depth. Secchi disk transparency is also measured at each site.

Water quality samples are collected, handled and tracked in accordance with procedures outlined in the North Dakota Department of Health, Division of Water Quality's *Standard Operating Procedures for Field Samplers* (NDDoH, 2001). Quality assurance/quality control protocols are outlined in the *Standard Operating Procedures for Field Samplers*. Analytical methods and procedures used for analysis of water quality samples are described in the *North Dakota Department of Health, Division of Chemistry's Quality Assurance Plan* (NDDoH, 2000). All results are available in the EPA's STOrage and RETrieval database (STORET).

### 3.0 Results and Discussion

This report primarily addresses surface (1 meter) concentrations or measurements of conductivity; chloride ( $\text{Cl}^-$ ); sulfate ( $\text{SO}_4^{2-}$ ); TDS; total ammonia ( $\text{NH}_3\text{-NH}_4^+$ ); nitrate-nitrite ( $\text{NO}_3^-$ - $\text{NO}_2^{2-}$ ); total nitrogen (TN); dissolved phosphorus (DP); total phosphorus (TP); chlorophyll-a; and Secchi depth. This report discusses spatial trends of samples collected in 2008 and between the years 1995-2008 spatial and temporal trends. The existence of trends was determined through visual interpretation of the figures. A more rigorous analysis would be needed to determine the statistical significance of these trends and to possibly detect trends not visible in the figures. The seasonal temperature and DO profiles for 2008 will be discussed in terms of thermal stratification and DO depletion.

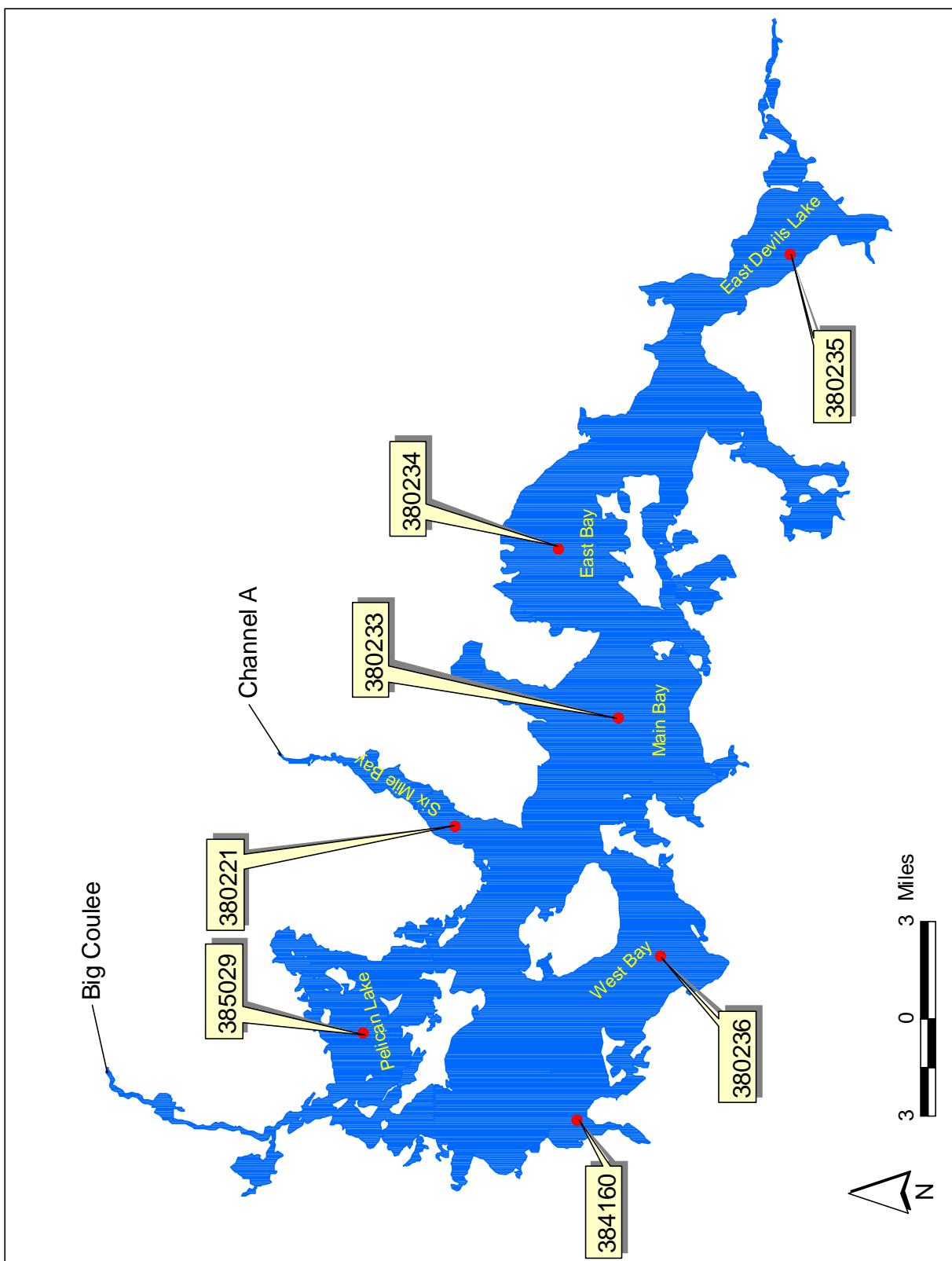


Figure 4. Devils Lake Sample Site Locations.

### **3.1 Trends in Conductivity, Chloride, Sulfate and TDS**

Devils Lake's ion concentrations have spatial, seasonal, and temporal trends. Additionally, the primarily indicators of ions concentrations, sulfates, chlorides, total dissolved solids and specific conductance are closely enough related that any one of them could be used as a surrogate for the other.

The spatial trend is from east to west with conductance and concentrations of chlorides, sulfates and total dissolved solids increasing as one travels east through the Devils Lake chain of bays and interconnected waters (Figures 5a-d). The seasonal trend is one of higher conductivity and concentrations of chloride, sulfate or total dissolved solids under ice cover than the following spring and then rebounding in late summer and fall (Figures 5a-d).

Long term monitoring trends (1995-2008) for conductivity, chloride, sulfate and total dissolved solids can be broken into two groups: (1) sites with have decreasing conductance and concentrations and (2) sites with steady or increasing conductance and concentrations. The locations with decreasing concentrations are Main Bay and East Bay of Devils Lake and East Devils Lake, and the locations with steady to increasing trends are West and Southwest West Bay of Devils Lake and Pelican Lake (Figures 6a-d). The fact there is a spatial and seasonal trend in the ion and ion associated measurements suggests that the trends are hydrologically influenced.

Basically all three trends types, spatial, seasonal, and long term in ions concentrations are likely due to increased water volume of Devils Lake. The trends are related to the increased water volume in the system which both dilutes the available ions and carries the dissolved ions further down the lake chain. The increase in lake volume and resulting trends began in 1993-1994 with above average snow pack and resulting spring melt runoff of 1994. Since 1994 Devils Lake has continued to rise from an elevation of 1428 feet above sea level in 1994 until the summer of 1999 when Devils Lake began to flow eastward into Stump Lake stabilizing the water level between 1447 and 1448 feet above sea level.

### **3.2 Trends in Nutrients, Chlorophyll-a and Secchi Depth**

Spatial trends in nutrients, chlorophyll-a concentrations and Secchi depth throughout the Devils Lake chain, both in 2008 and over the long term (1995-2008) are difficult to discern because of the temporal variability inherent in those parameters. East Devils Lake was the exception in that nutrient concentrations are noticeably higher than the other sampling locations between 1995 and 2008 (Figures 6f-g).

Long term trends are observable for total nitrogen, total phosphorus and total dissolved phosphorus at some but not all sites. Total nitrogen concentrations in East Bay, West Bay and Main Bay decreased considerably in 1998 and then remained relatively consistent through 2008. When all nutrient data (1995-2008) are compared for these sites the values are generally decreasing after 1998 or 2001.

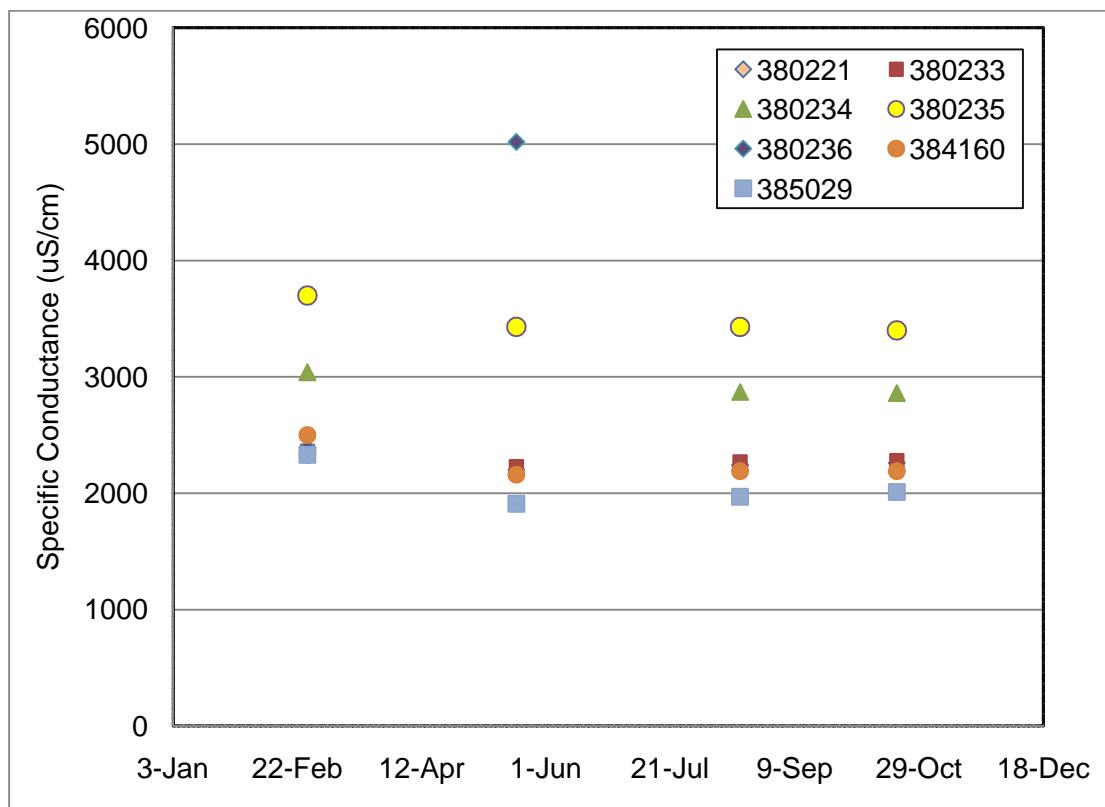
No spatially or temporally trends are not observable for secchi disk or in chlorophyll-a. However there is a season increase in chlorophyll-a as expected with the lengthening of the days and increased in lake surface water temperatures. Additionally, secchi disk transparency depth

decreased from spring to fall at the majority of the sampling locations supporting the analysis of increased chlorophyll-a concentrations.

### 3.3 Dissolved Oxygen Profiles and Temperature Profiles

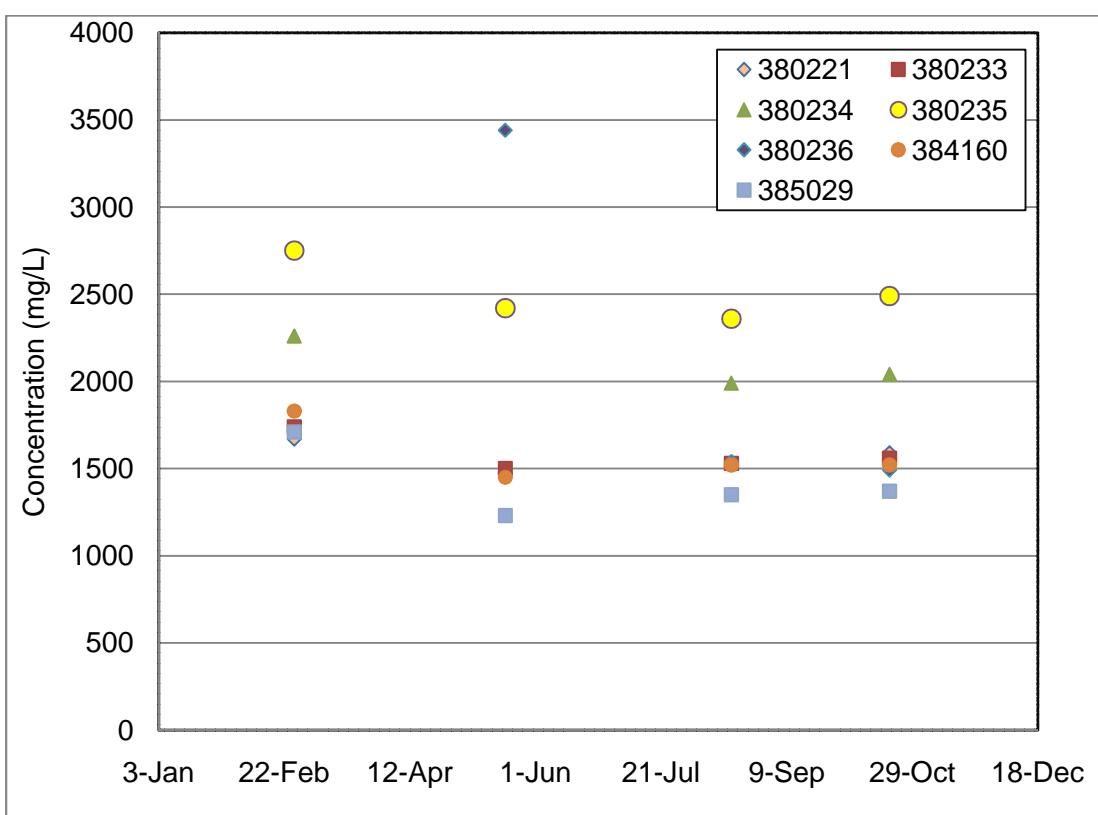
Dissolved oxygen depletion occurs where decomposition of organic matter and respiration exceed oxygen diffusion rates and photosynthesis through the water column. During 2008 and for the length of this investigation Devils Lake has maintained healthy concentrations of dissolved oxygen for nearly the entire water column year round.

On occasion dissolved oxygen concentrations noticeably decreased at lower depths in the water column (Figures 7a-g). While there is a sediment influenced demand for oxygen that is measurable, over 80 percent of the water column remains well above the State standard of 5 mg/L.

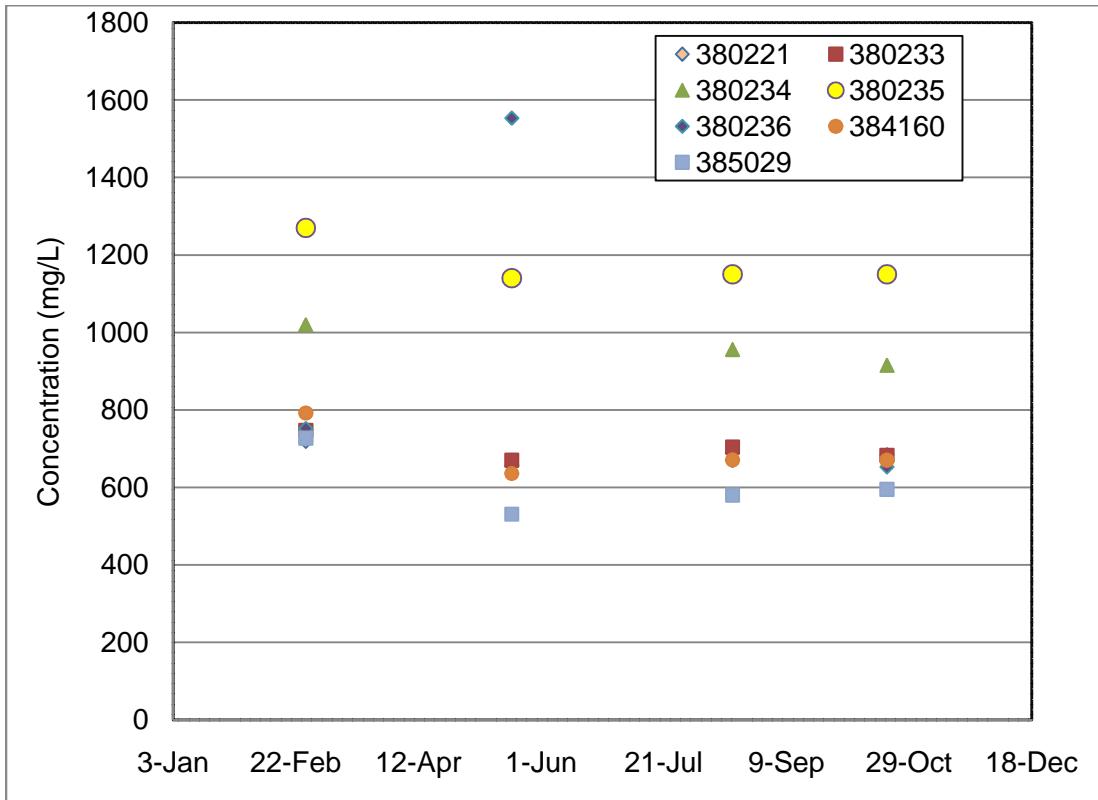


5a. Specific Conductance 2008 Concentrations.

**Figure 5. Surface Concentrations (Collected at 1 Meter) of Selected Parameters for Each Devils Lake Sampling Site and Event in 2008.**

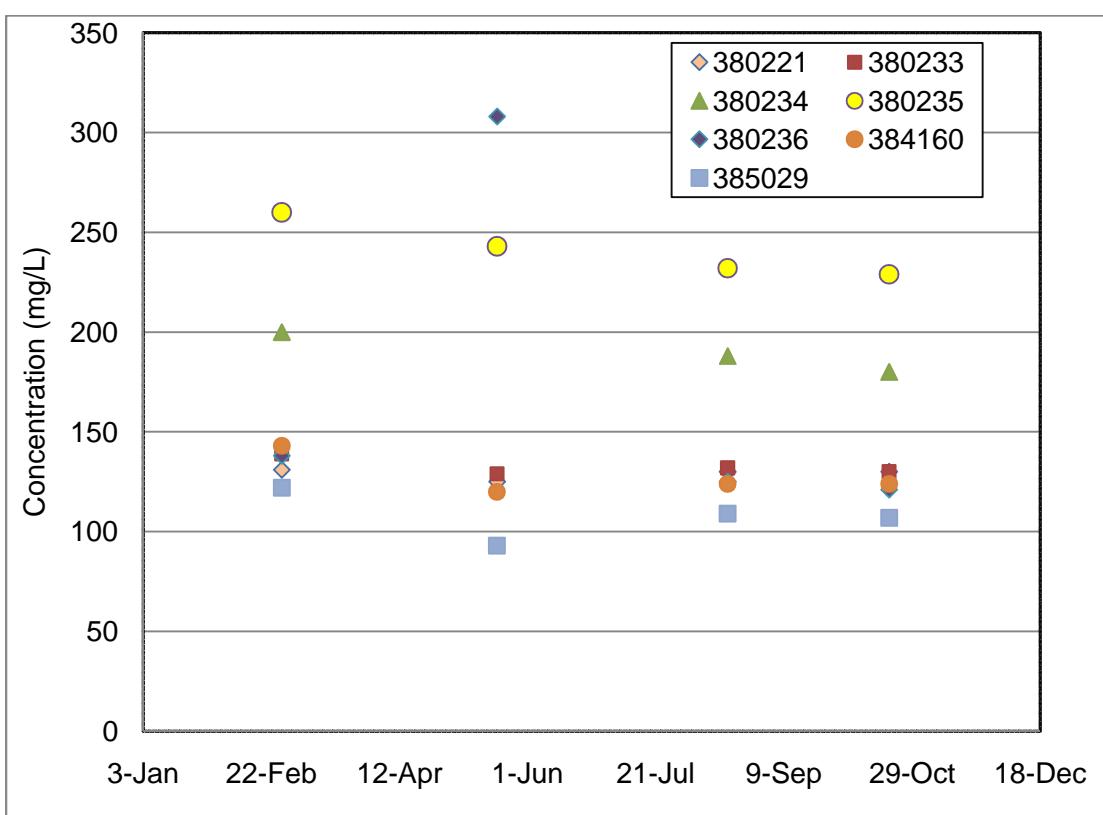


5b. Total Dissolved Solids 2008 Concentrations.

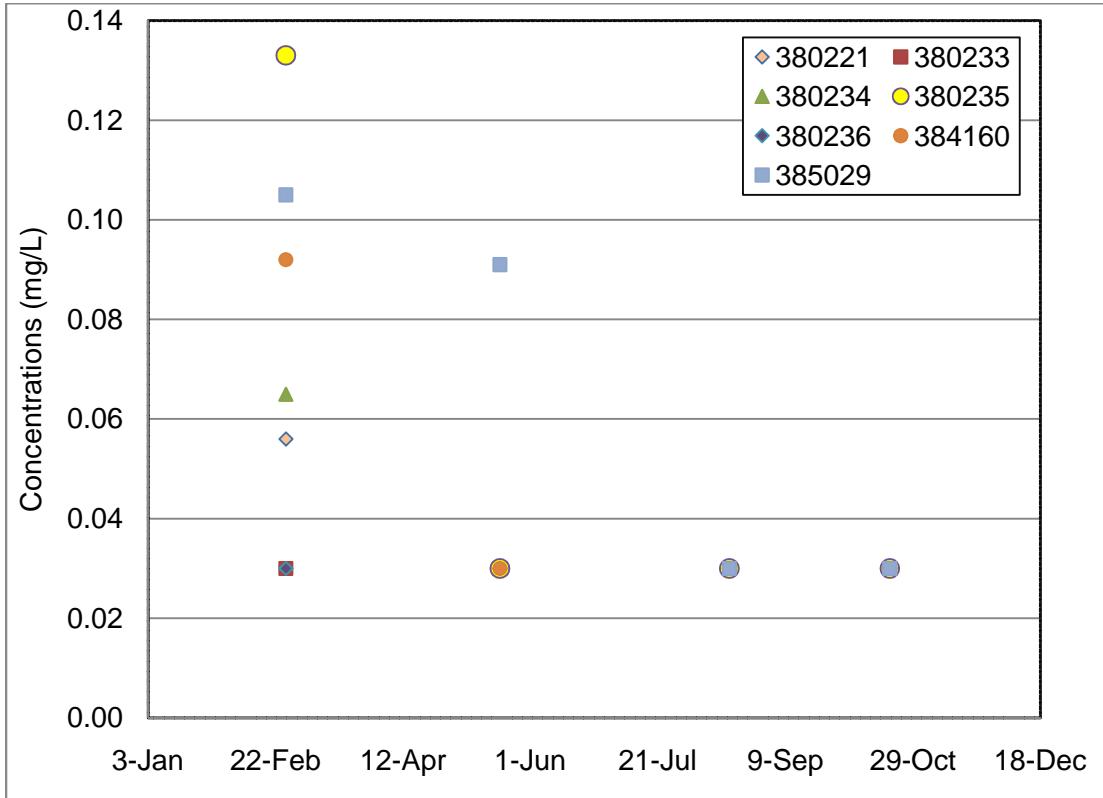


5c. Sulfates 2008 Concentrations.

**Figure 5. Continued**

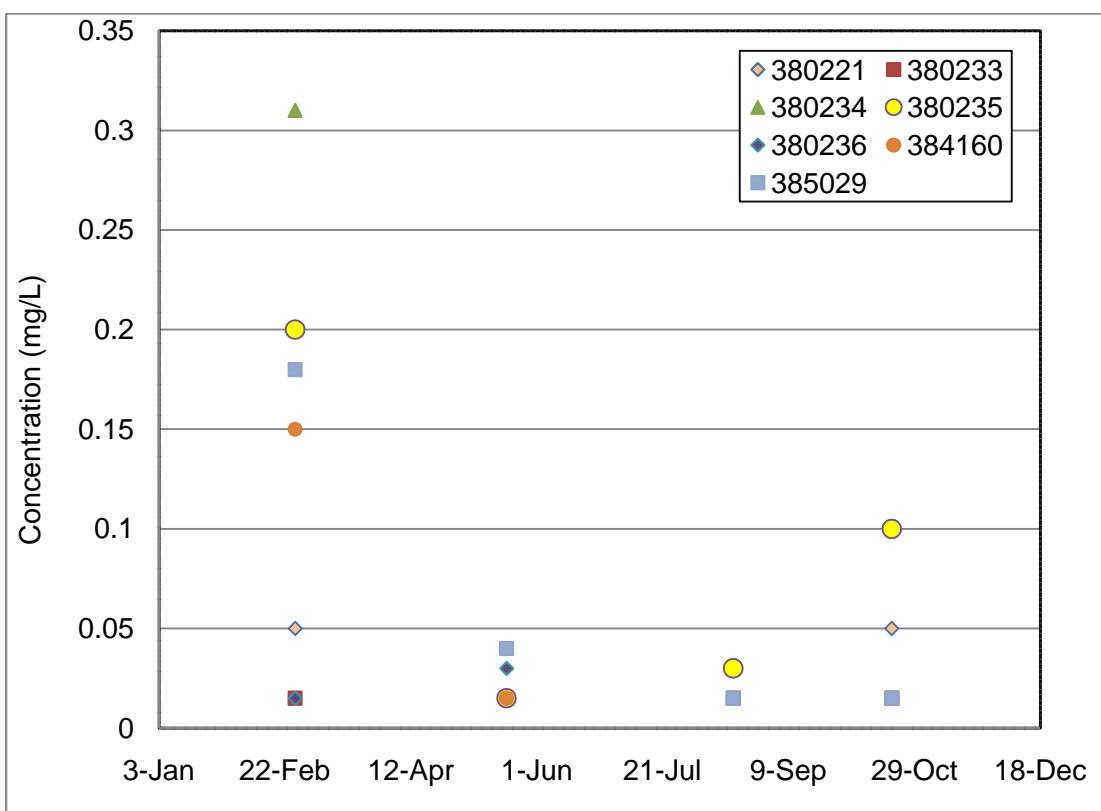


5d. Chlorides 2008 Concentrations.

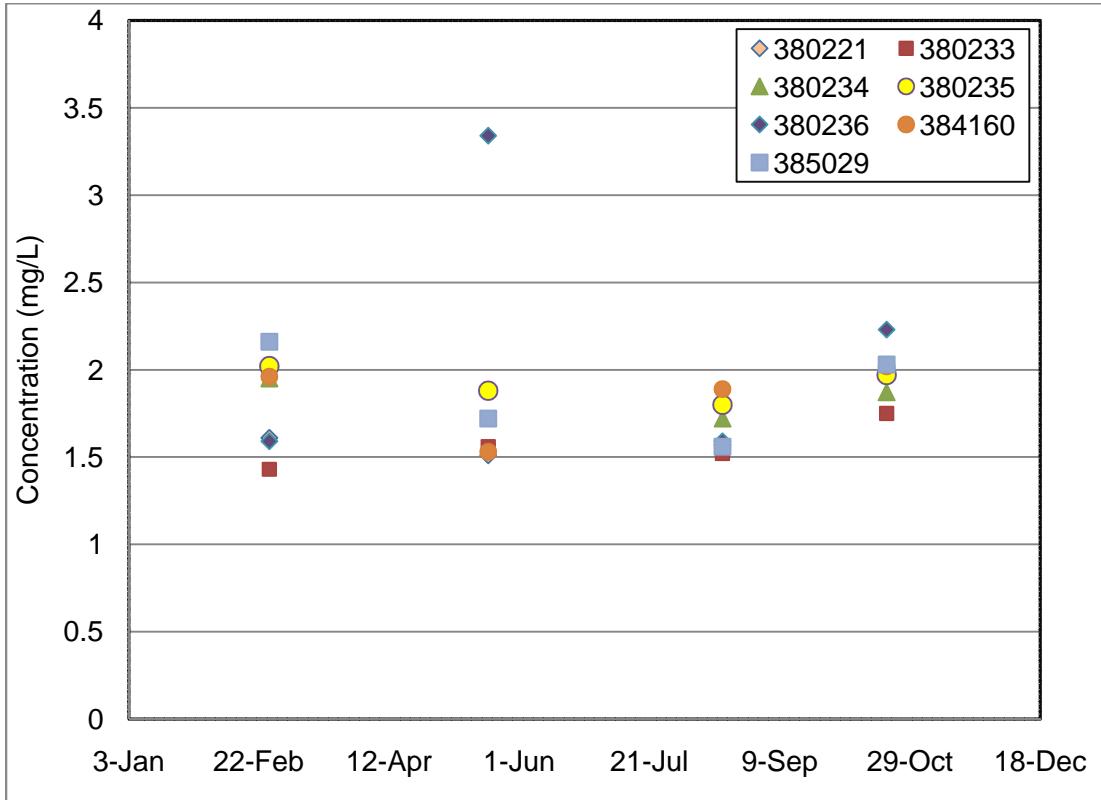


5e. Total Ammonia 2008 Concentrations.

**Figure 5. Continued**

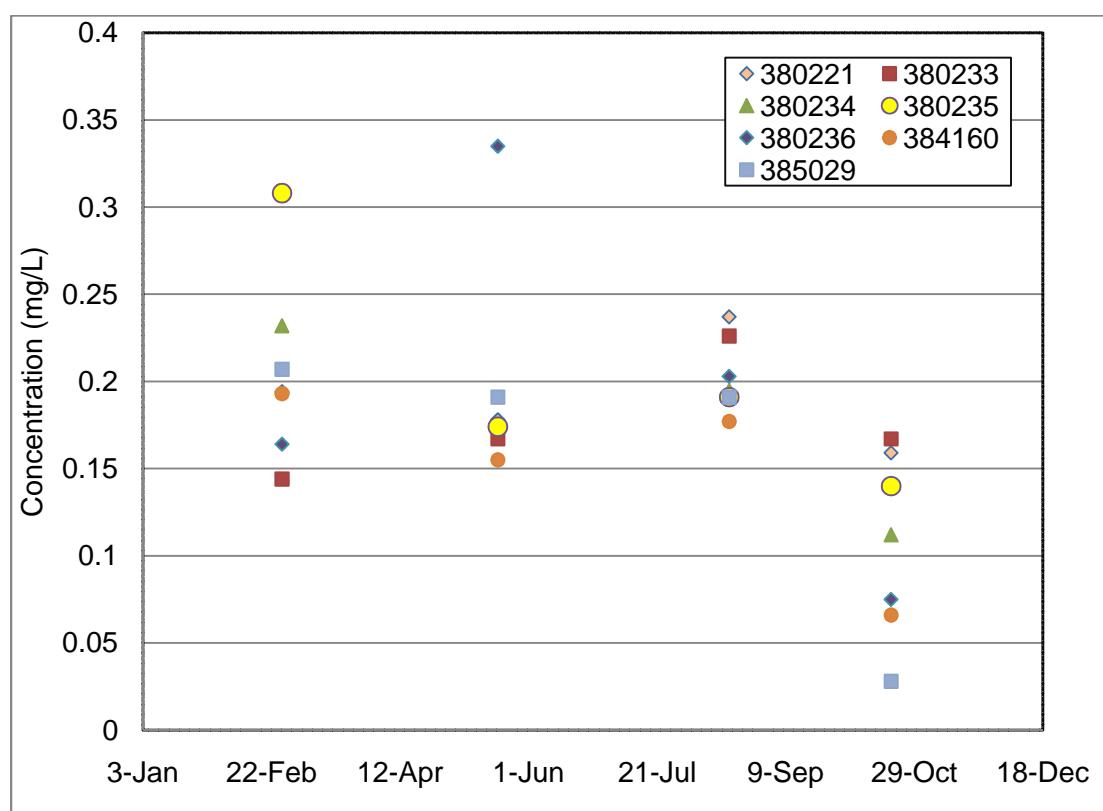
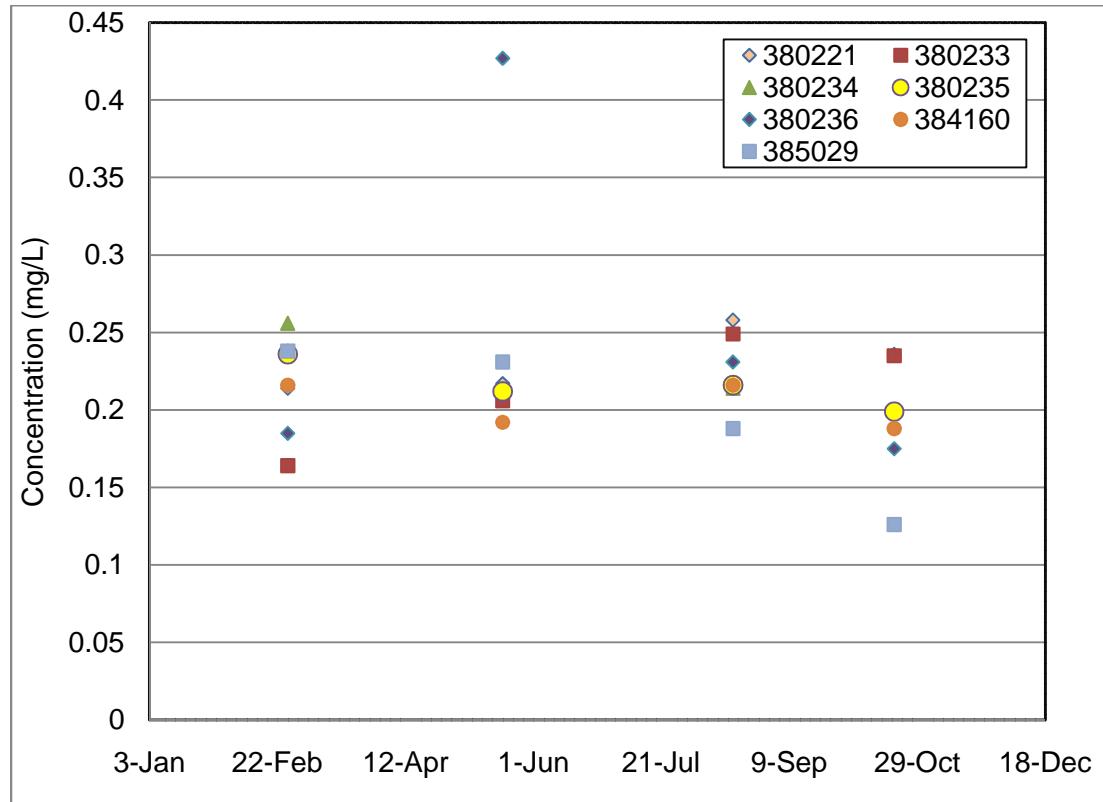


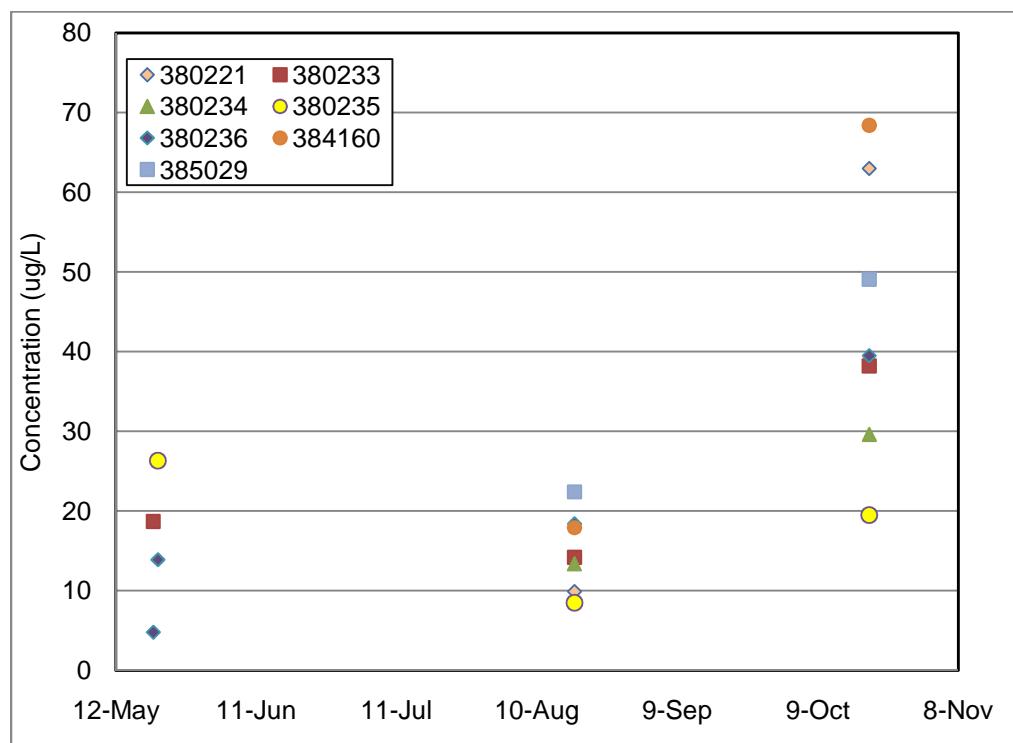
5f. Nitrate + Nitrite as Nitrogen 2008 Concentrations.



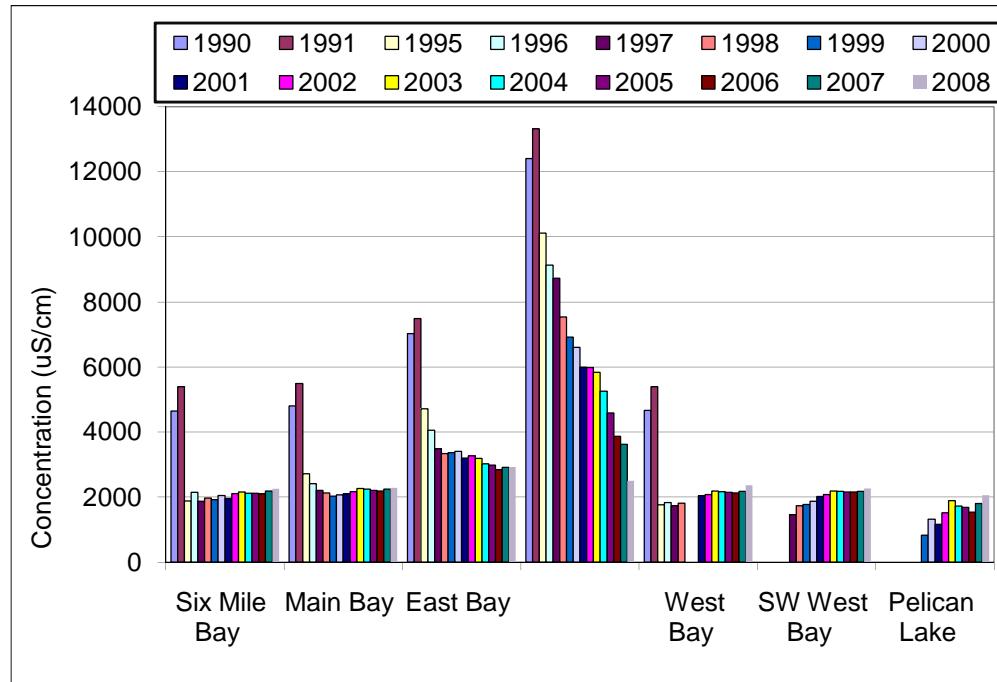
5g. Total Nitrogen 2008 Concentrations.

**Figure 5. Continued**

**5h.** Total Dissolved Phosphorus 2008 Concentrations.**5i.** Total Phosphorus 2008 Concentrations.**Figure 5. Continued**

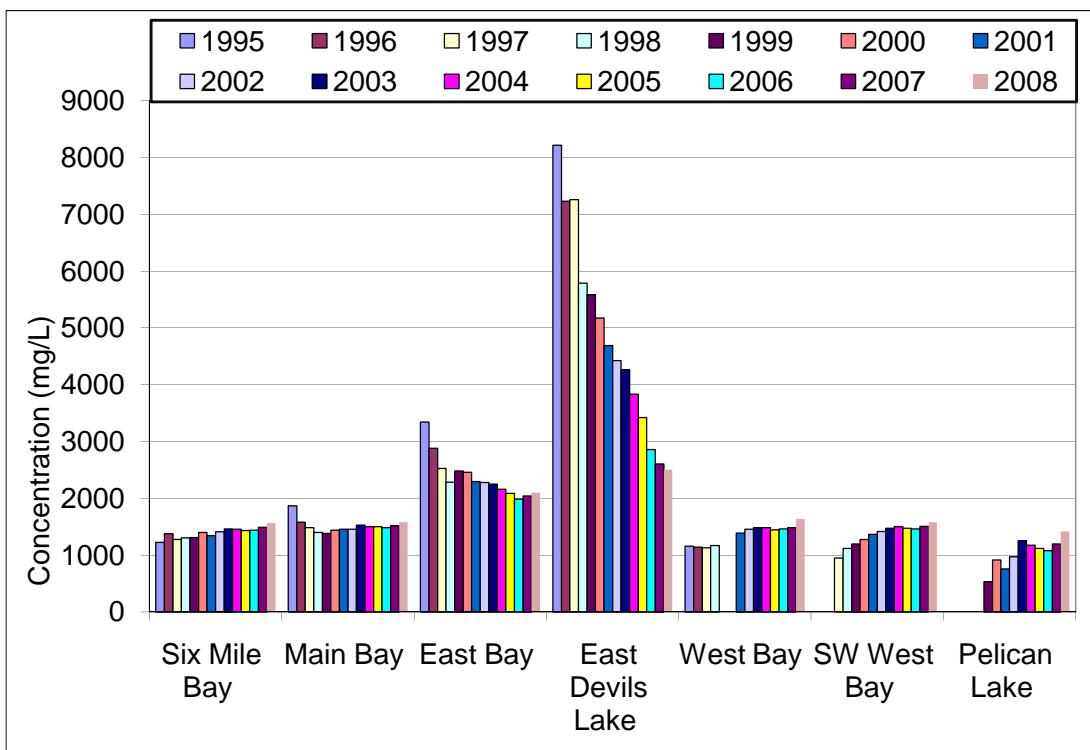
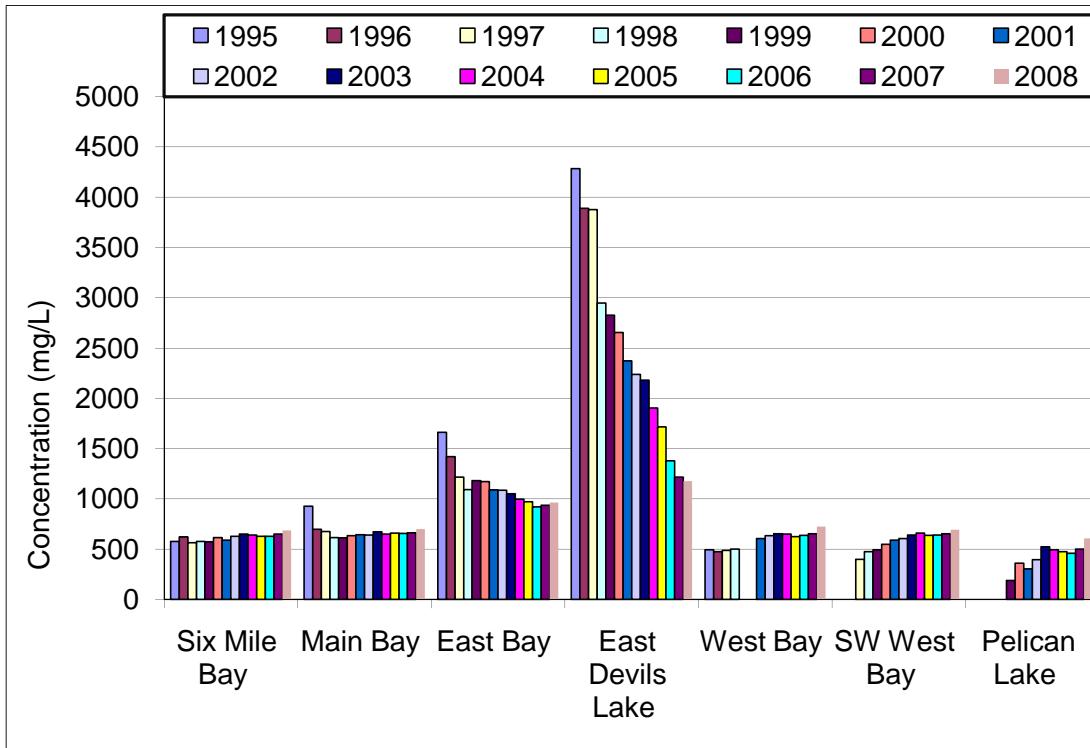


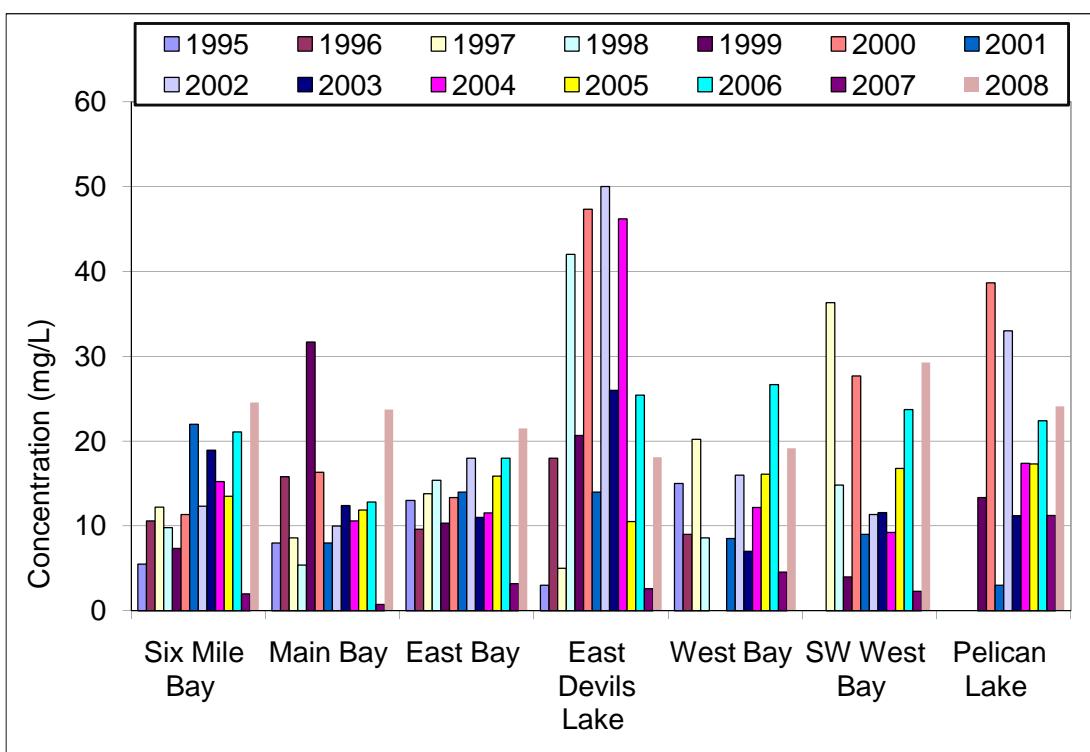
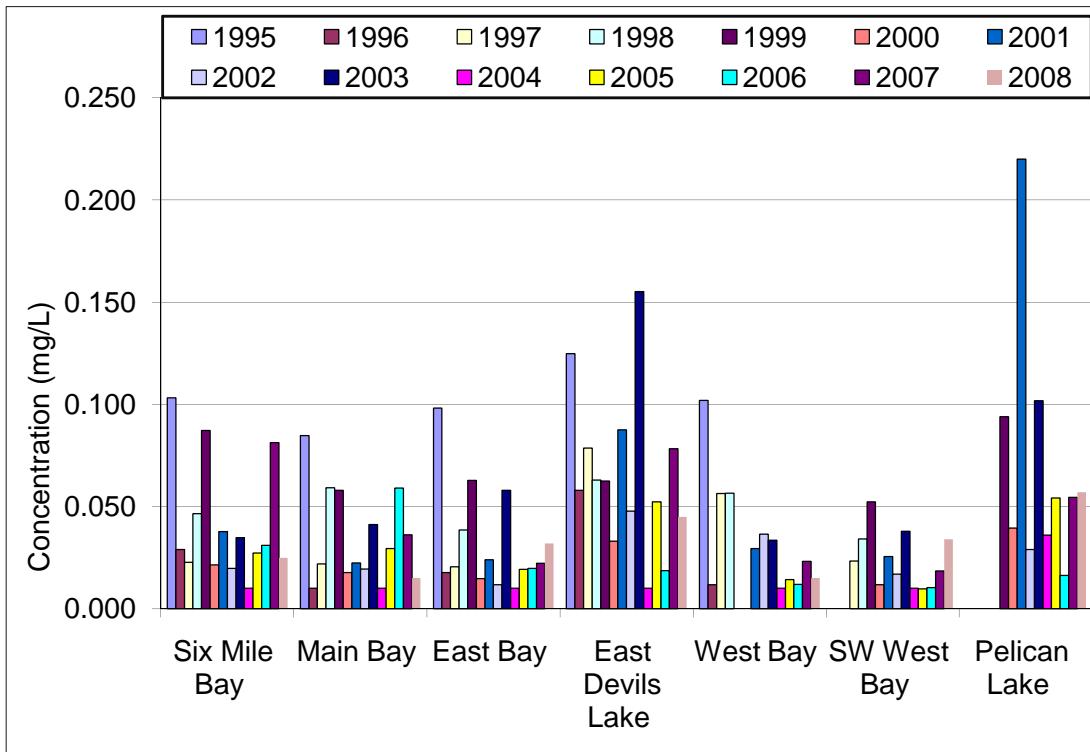
5j. Chlorophyll-a 2008 Concentrations.

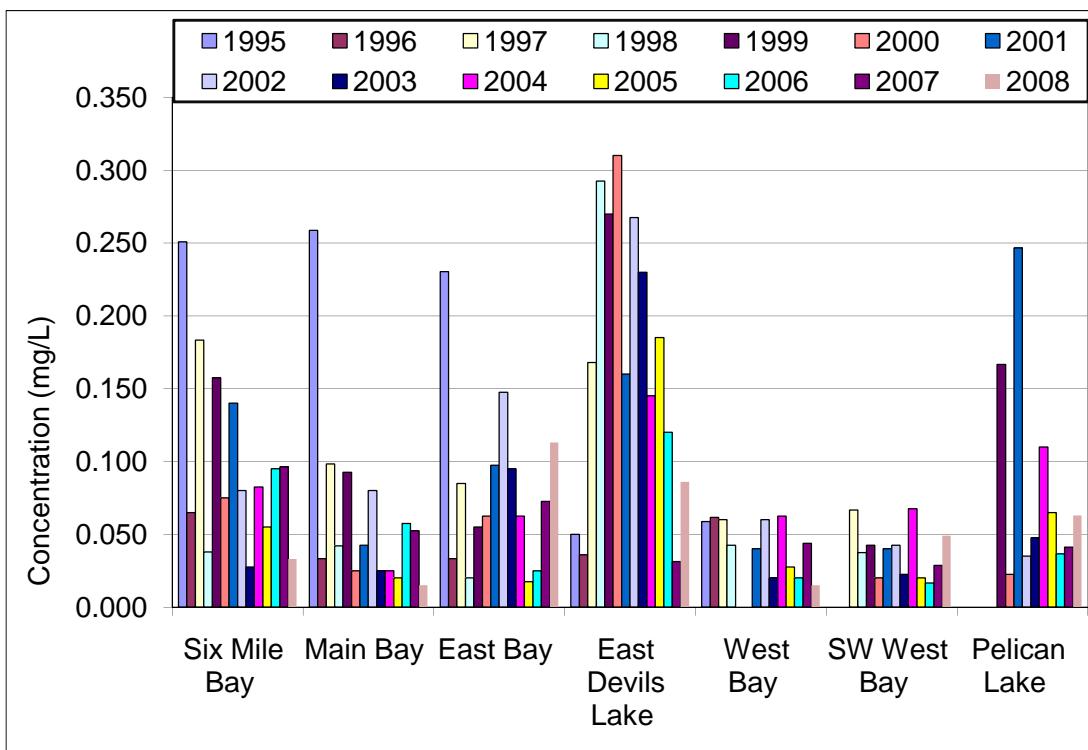
**Figure 5. Continued**

6a. Specific Conductance Annual Mean Concentrations.

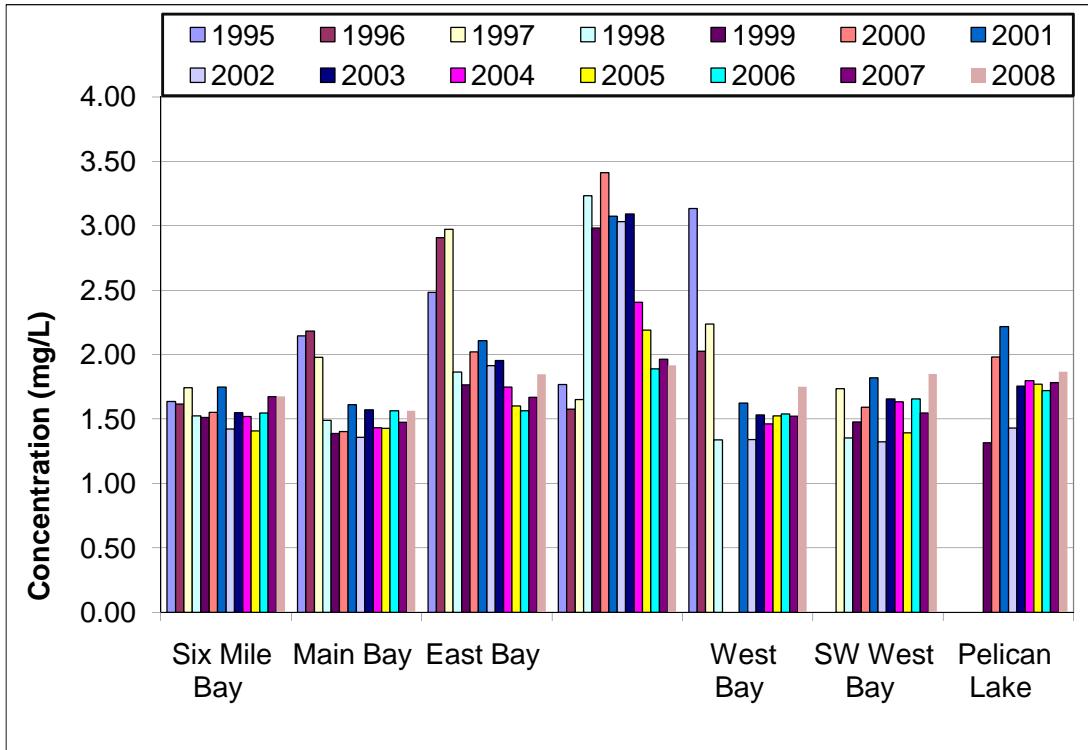
**Figure 6. Annual Mean Concentration of Selected Parameters (Collected at 1 Meter) at Devils Lake Sampling Sites for the Period of 1995-2008.**

**6b.** Total Dissolved Solids Annual Mean Concentrations.**6c.** Sulfate Annual Mean Concentrations.**Figure 6. Continued.**

**6d.** Chloride Annual Mean Concentrations.**6e.** Total Ammonia Annual Mean Concentrations.**Figure 6. Continued.**

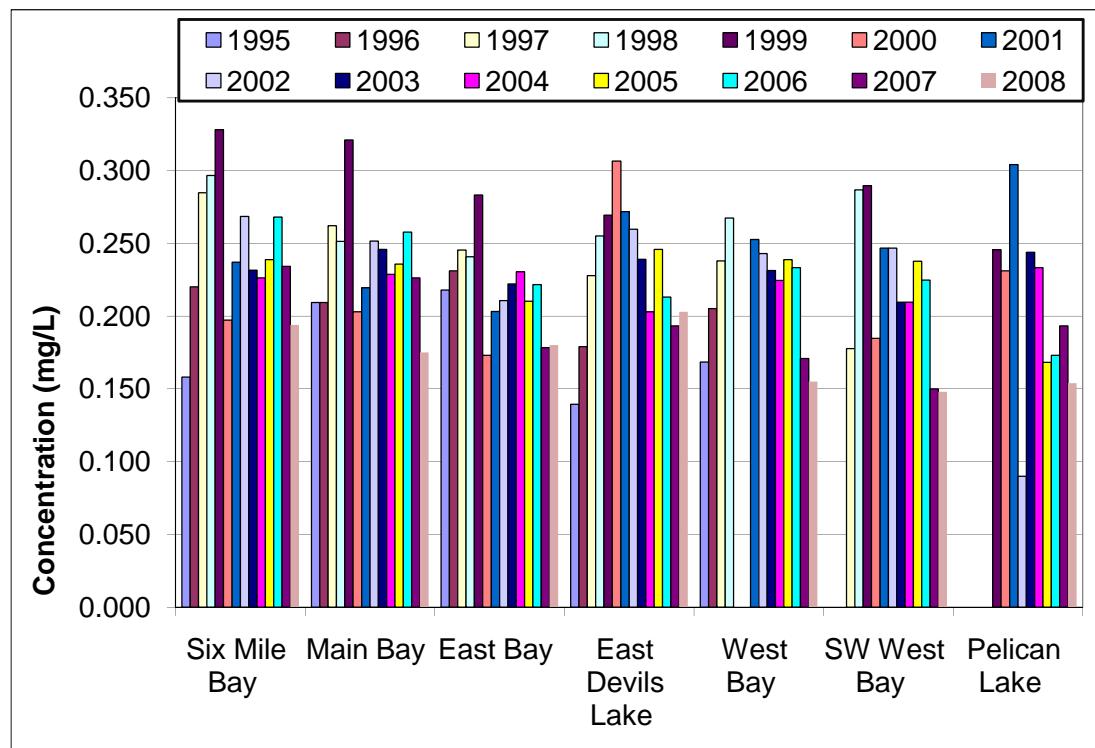
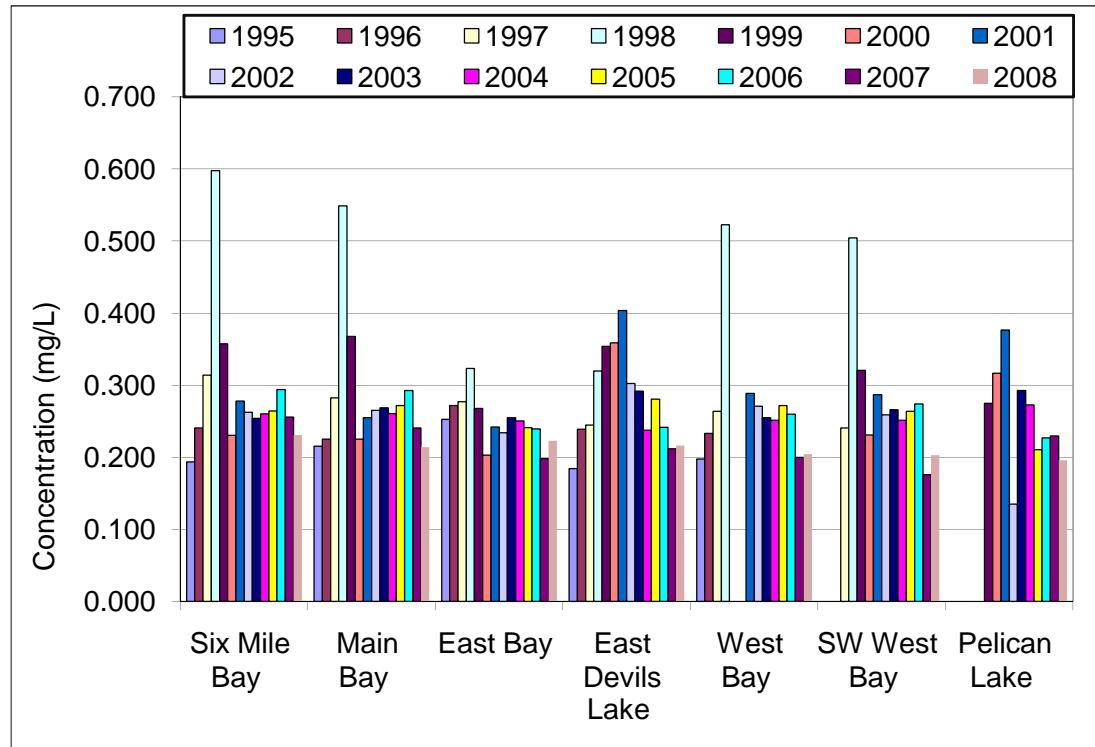


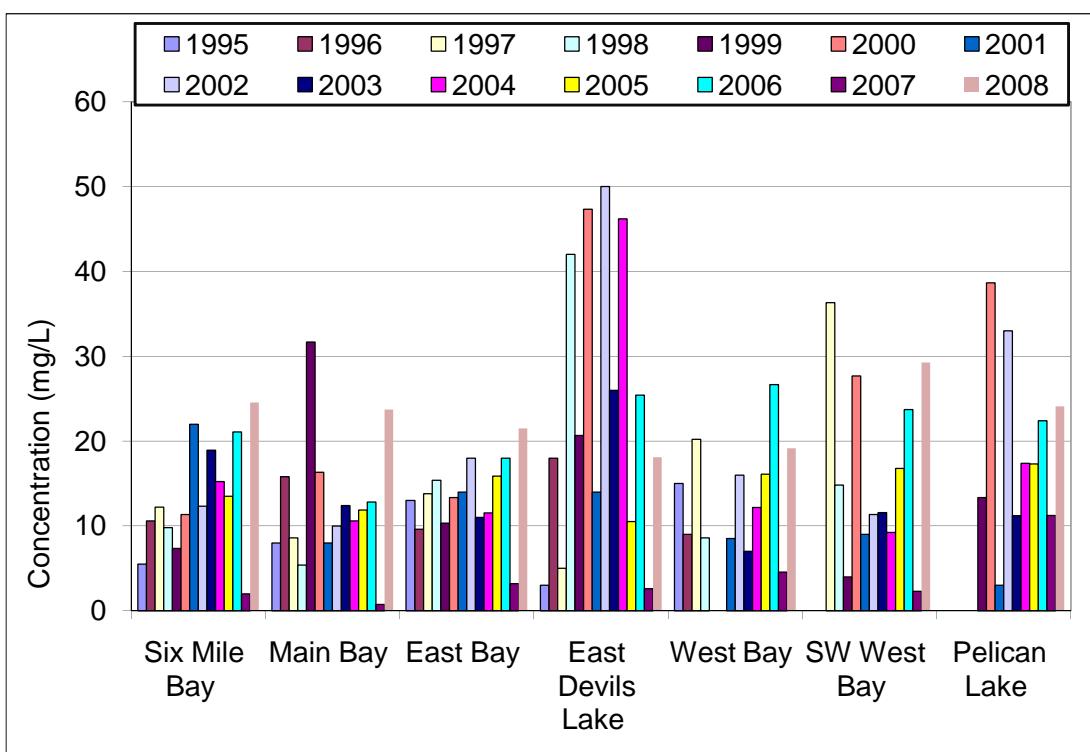
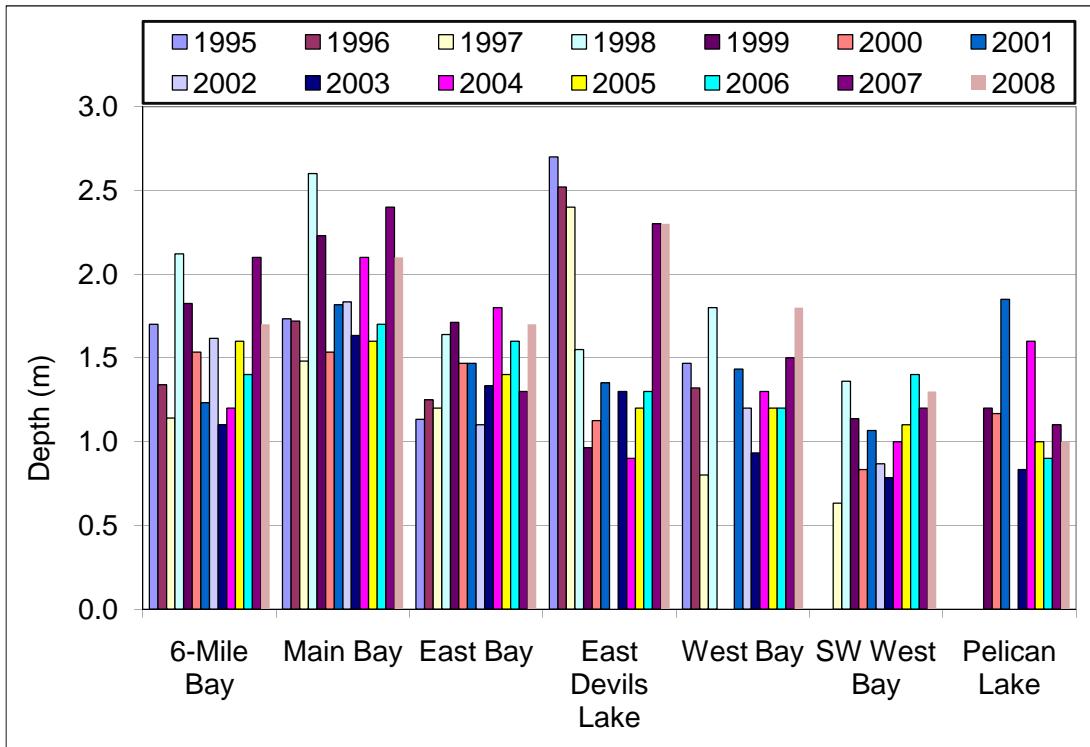
6f. Nitrate + Nitrite Annual Mean Concentrations.

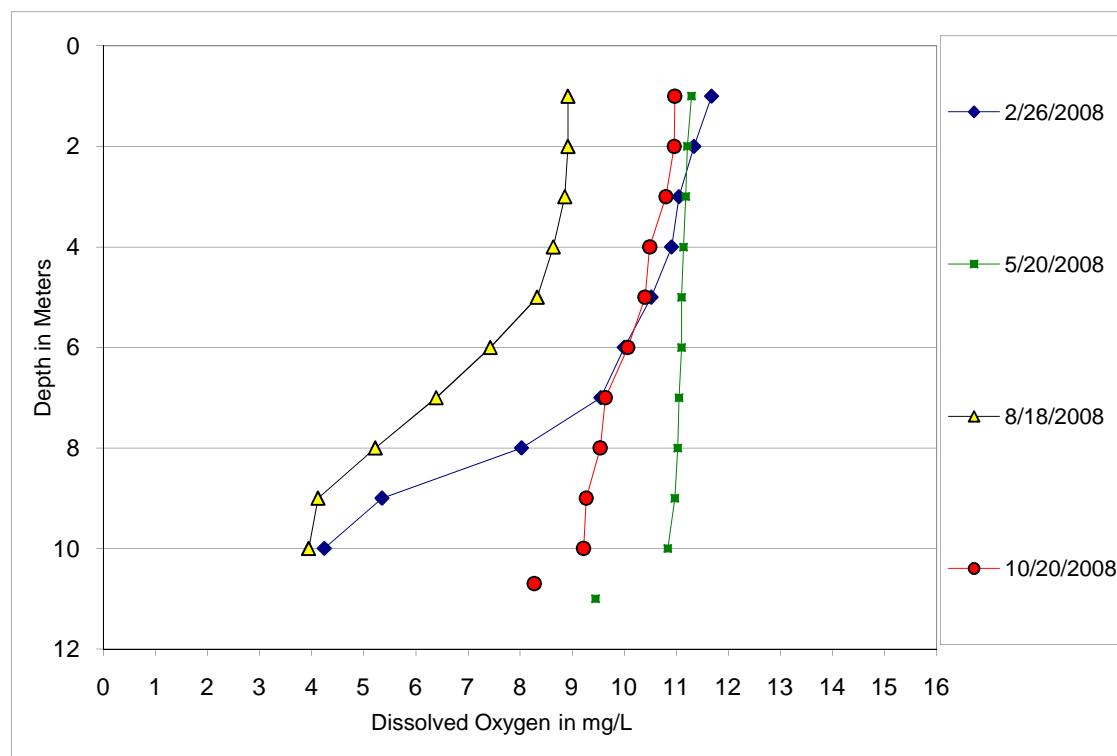


6g. Total Nitrogen Annual Mean Concentrations.

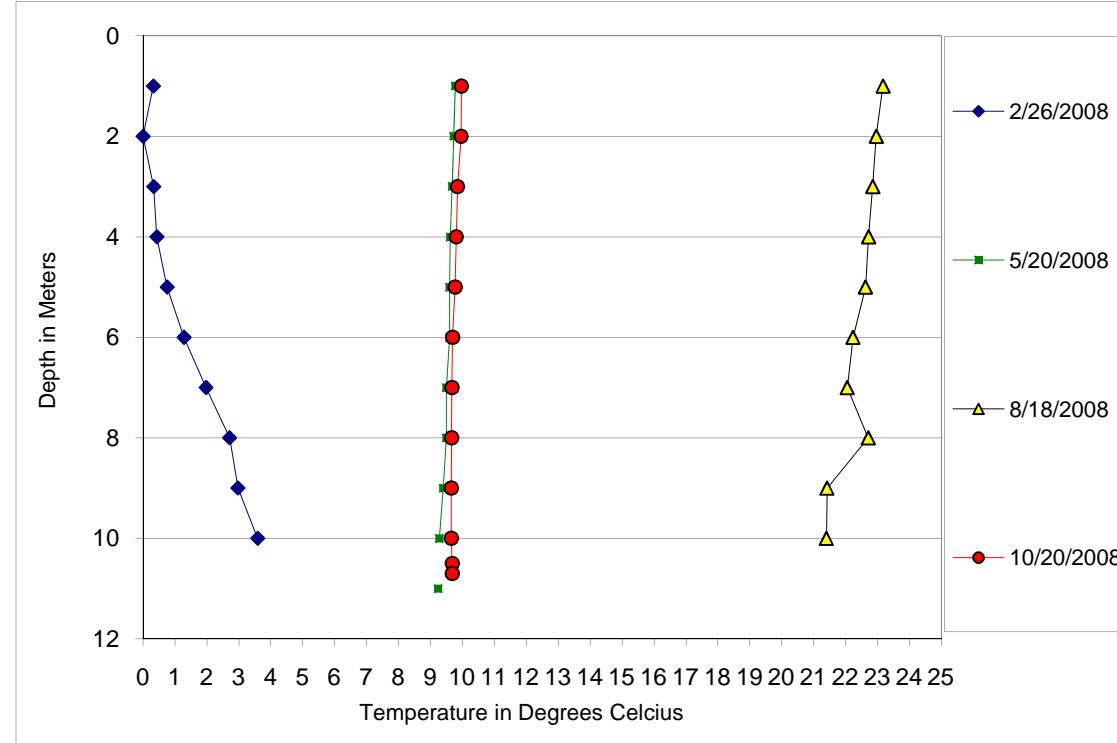
**Figure 6. Continued.**

**6h.** Total Dissolved Phosphorus Annual Mean Concentrations.**6i.** Total Phosphorus Annual Mean Concentrations.**Figure 6. Continued.**

**6j.** Chlorophyll-a Annual Mean Concentrations.**6k.** Secchi Disk Annual Mean Depths.**Figure 6. Continued.**

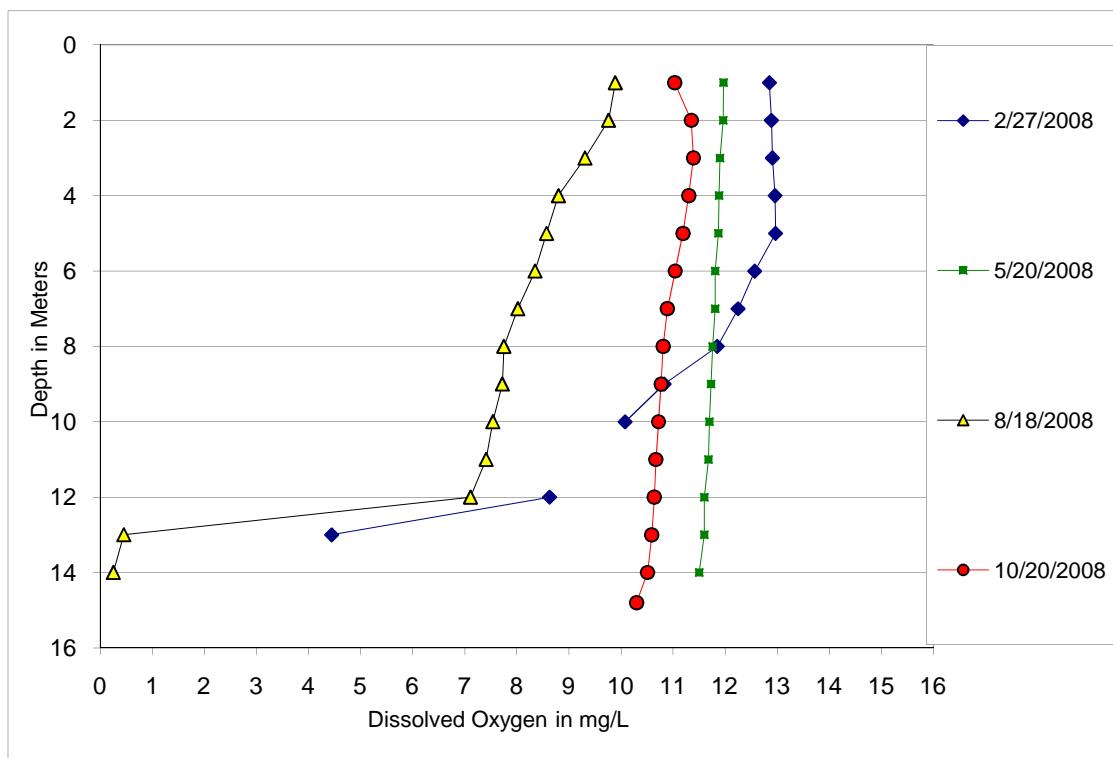


7a. Dissolved Oxygen Profiles for Six Mile Bay.

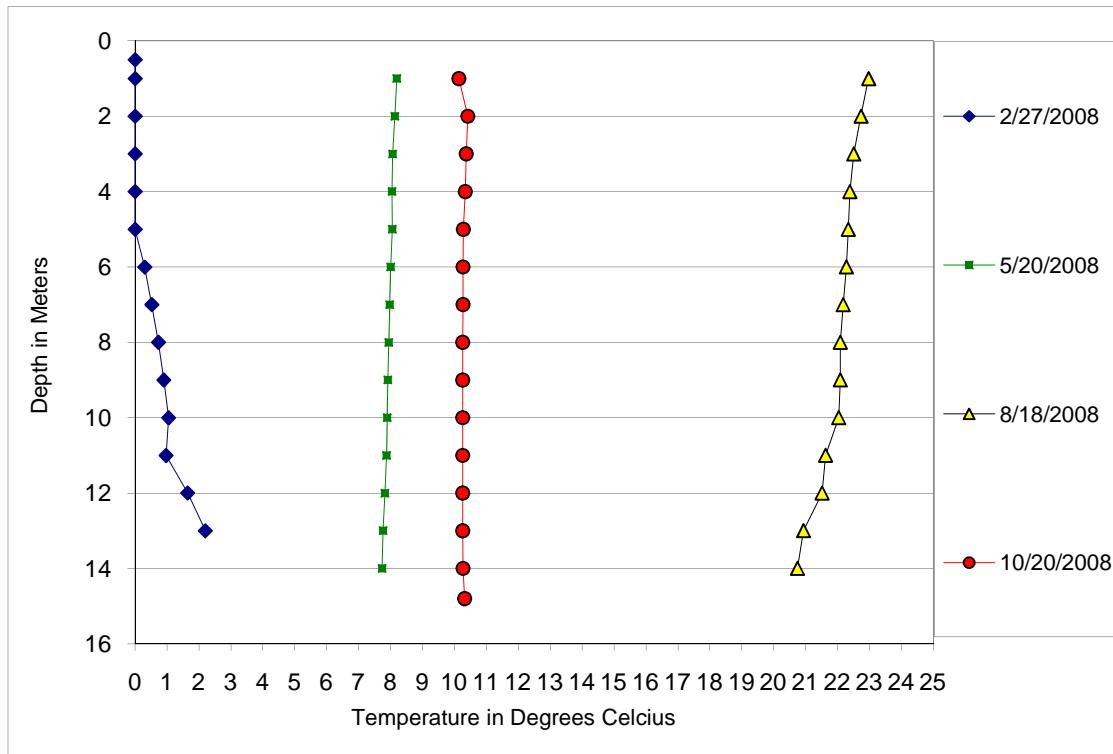


7b. Temperature Profiles for Six Mile Bay.

**Figure 7. Temperature and Dissolved Oxygen Profiles for Devils Lake Sampling Sites and Events in 2008.**

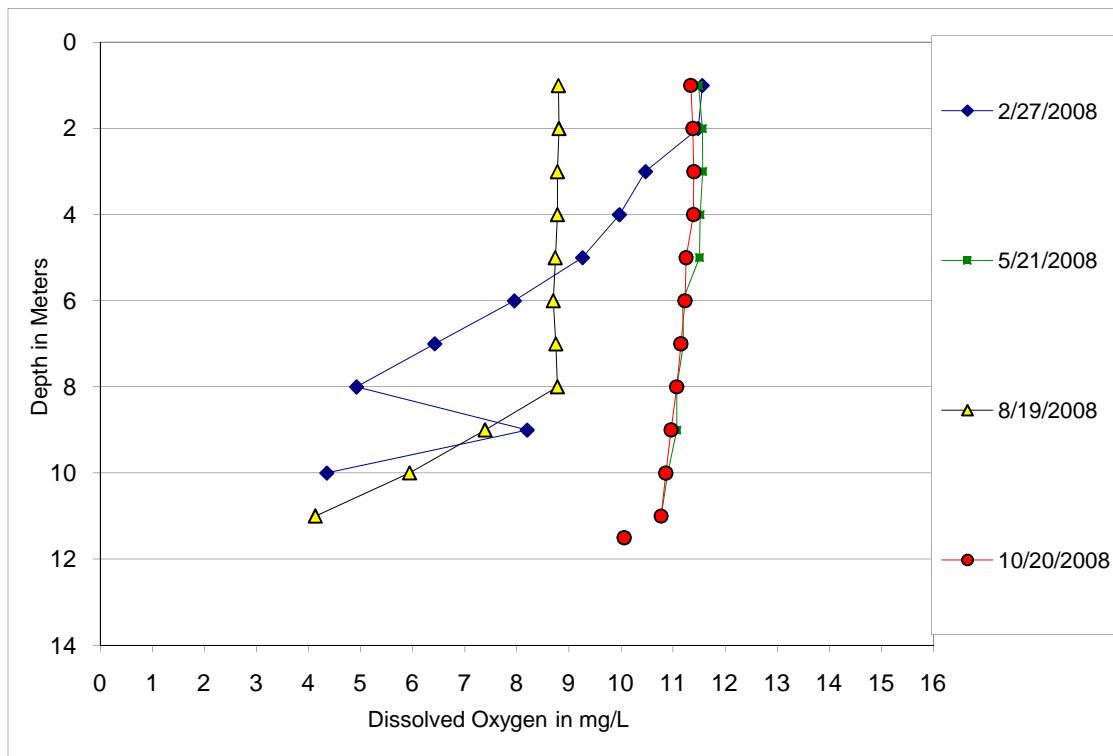


7c. Dissolved Oxygen Profiles for Main Bay.

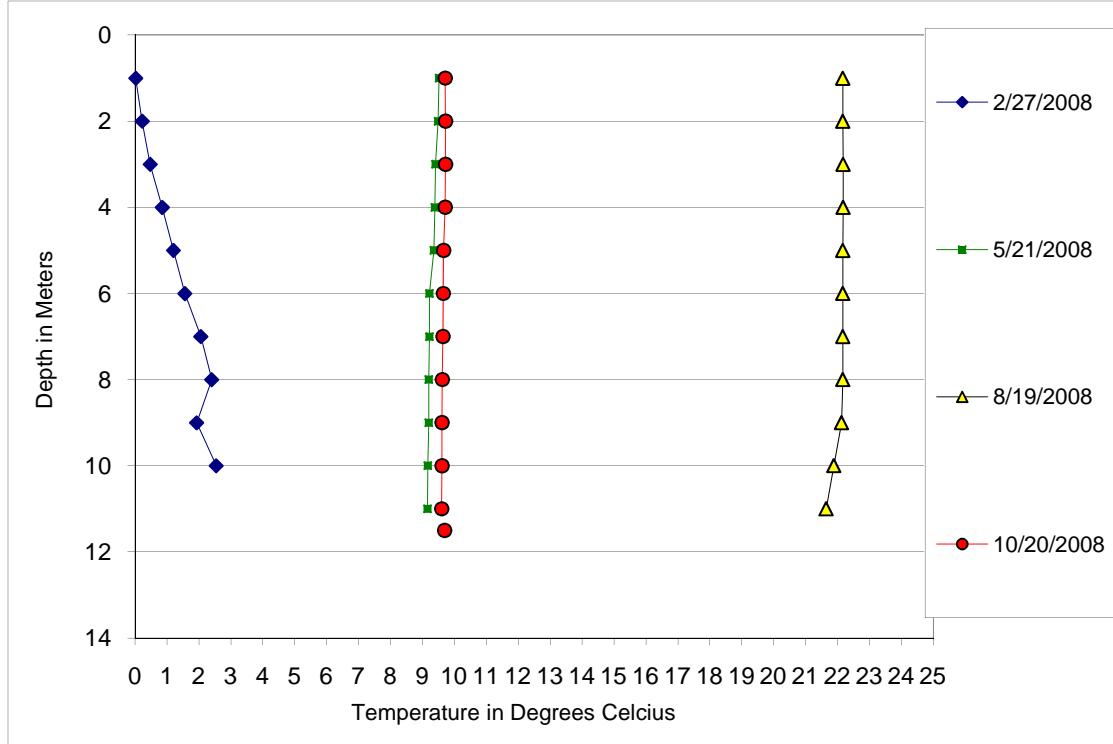


7d. Temperature Profiles for Main Bay.

**Figure 7. Continued.**

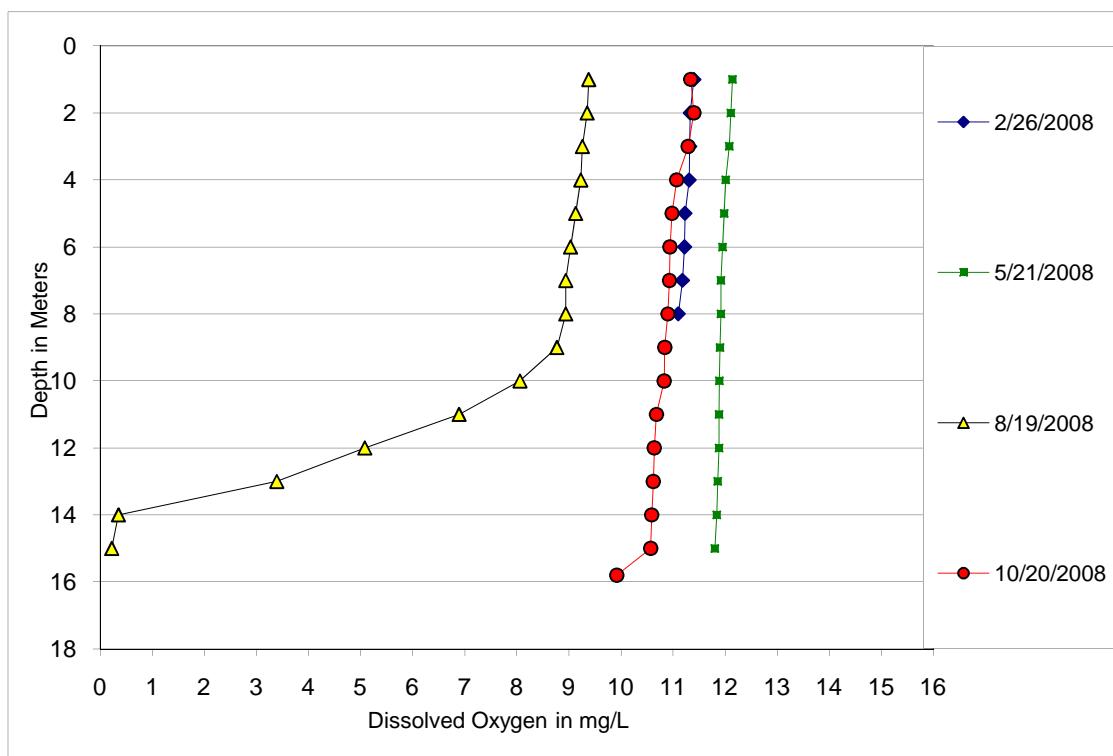


7e. Dissolved Oxygen Profiles for East Bay.

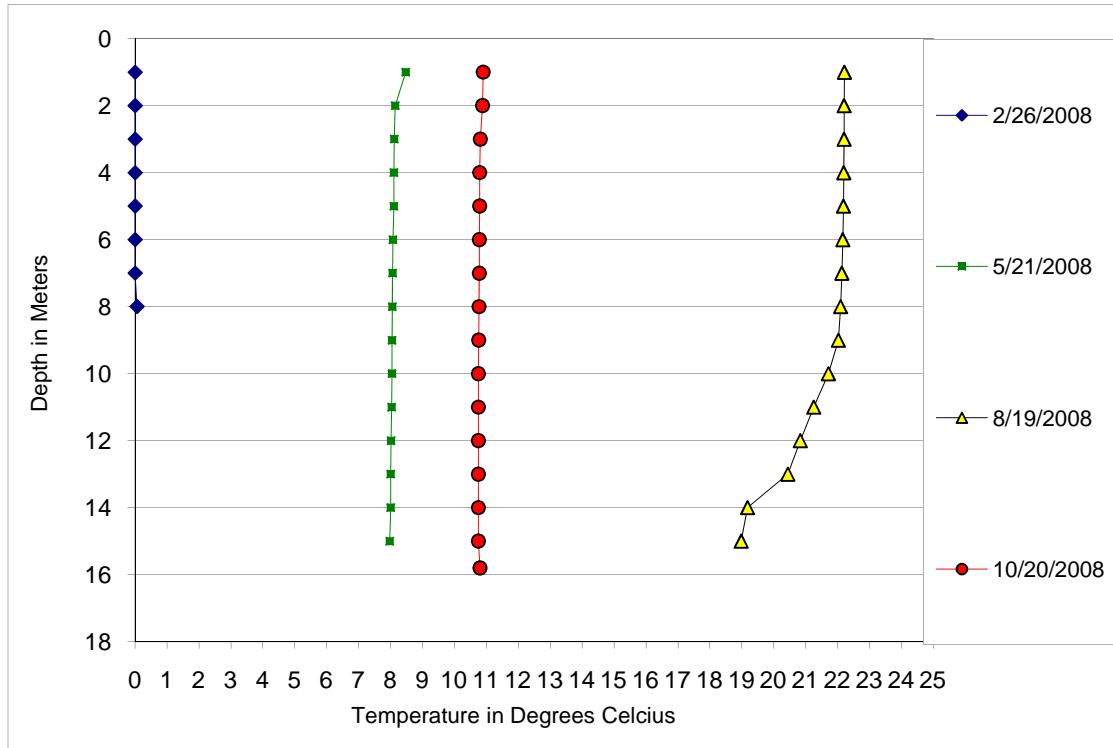


7f. Temperature Profiles for East Bay.

**Figure 7. Continued.**

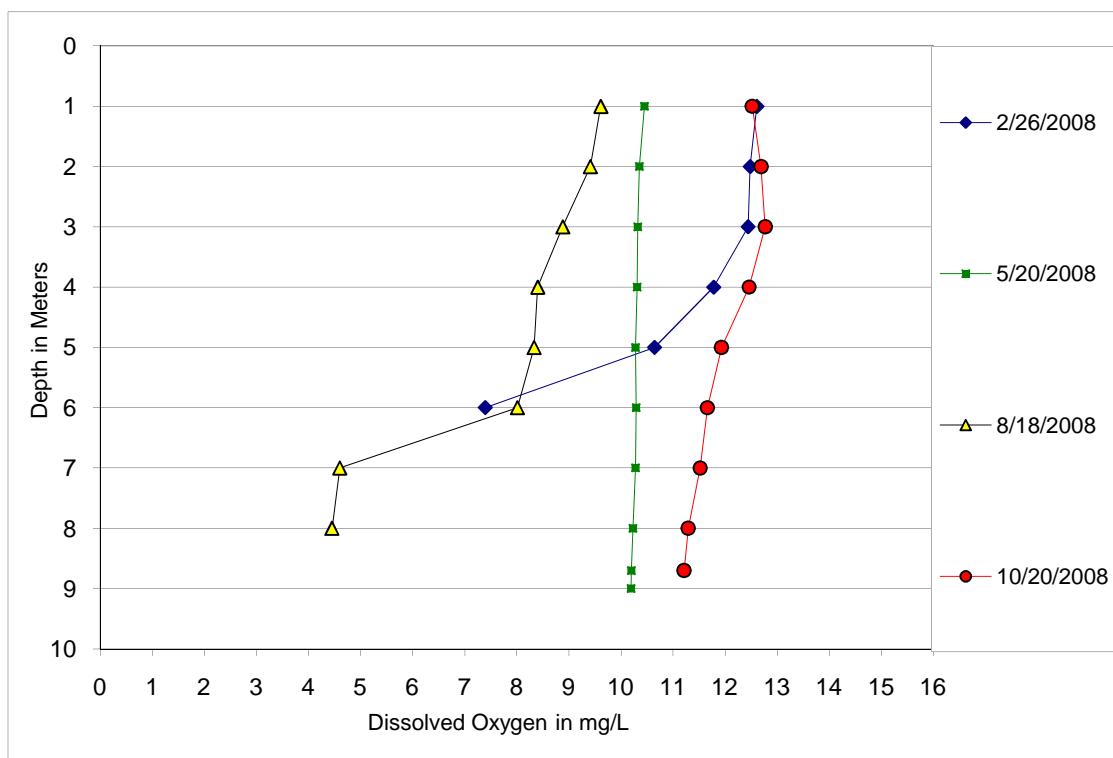


7g. Dissolved Oxygen Profiles for East Devils Lake.

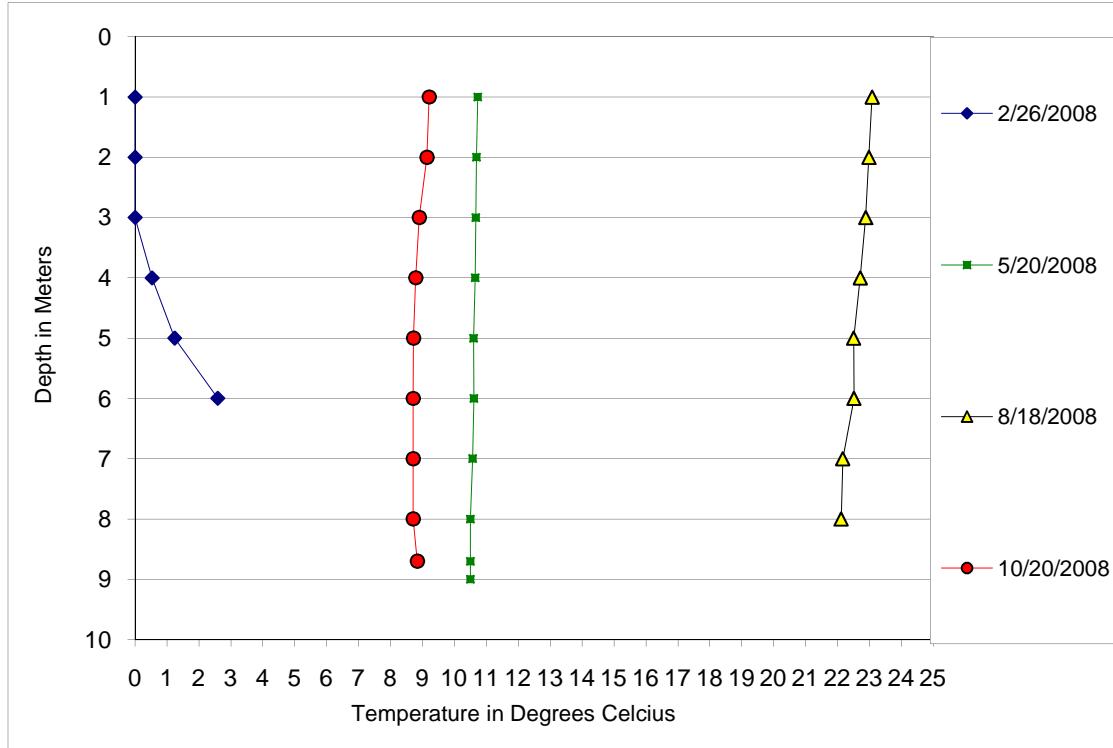


7h. Temperature Profiles for East Devils Lake.

**Figure 7. Continued.**

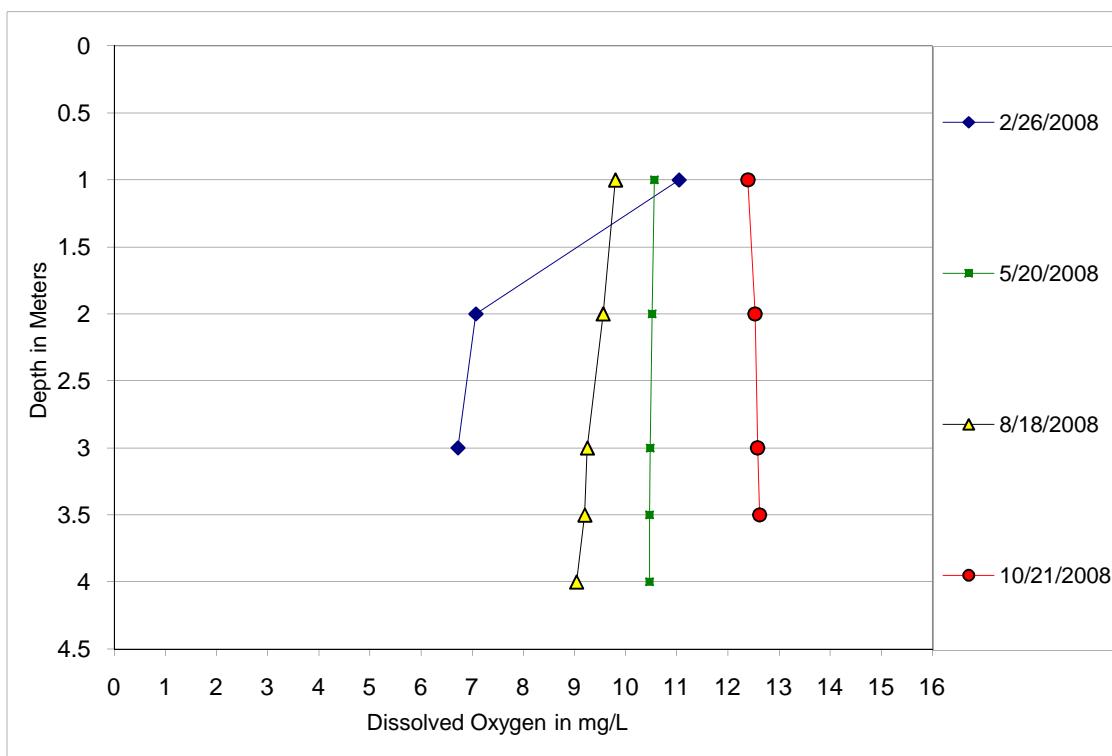


7i. Dissolved Oxygen Profiles for West Bay.

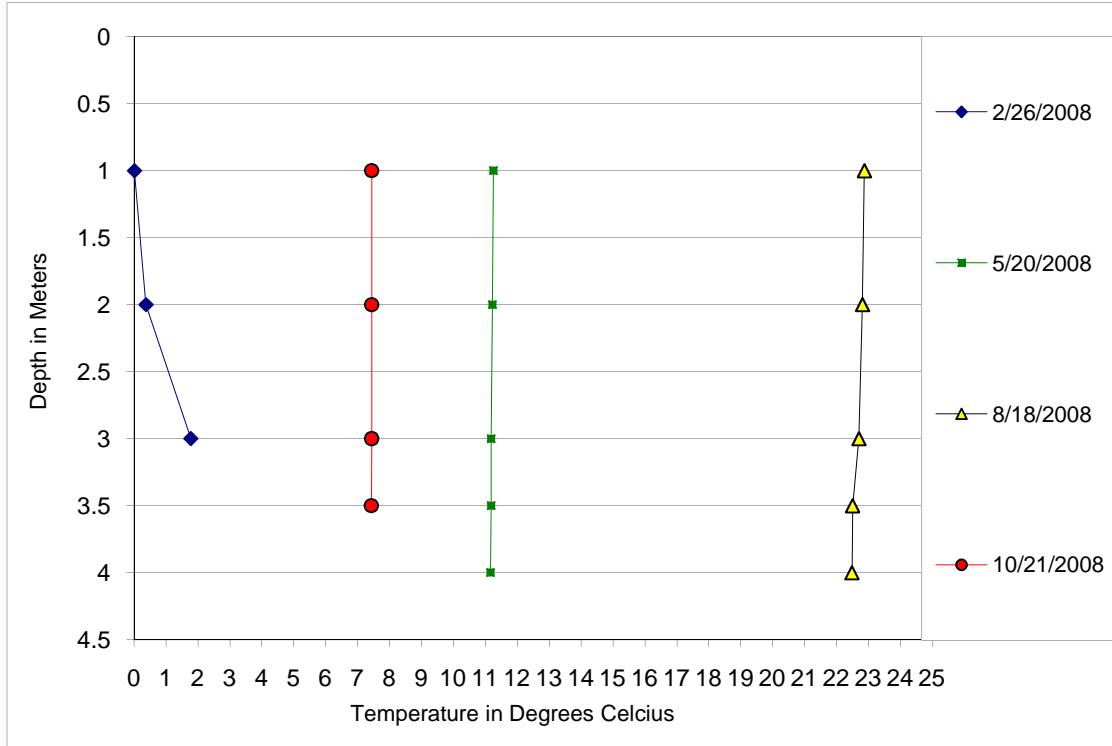


7j. Temperature Profiles for West Bay.

**Figure 7. Continued.**

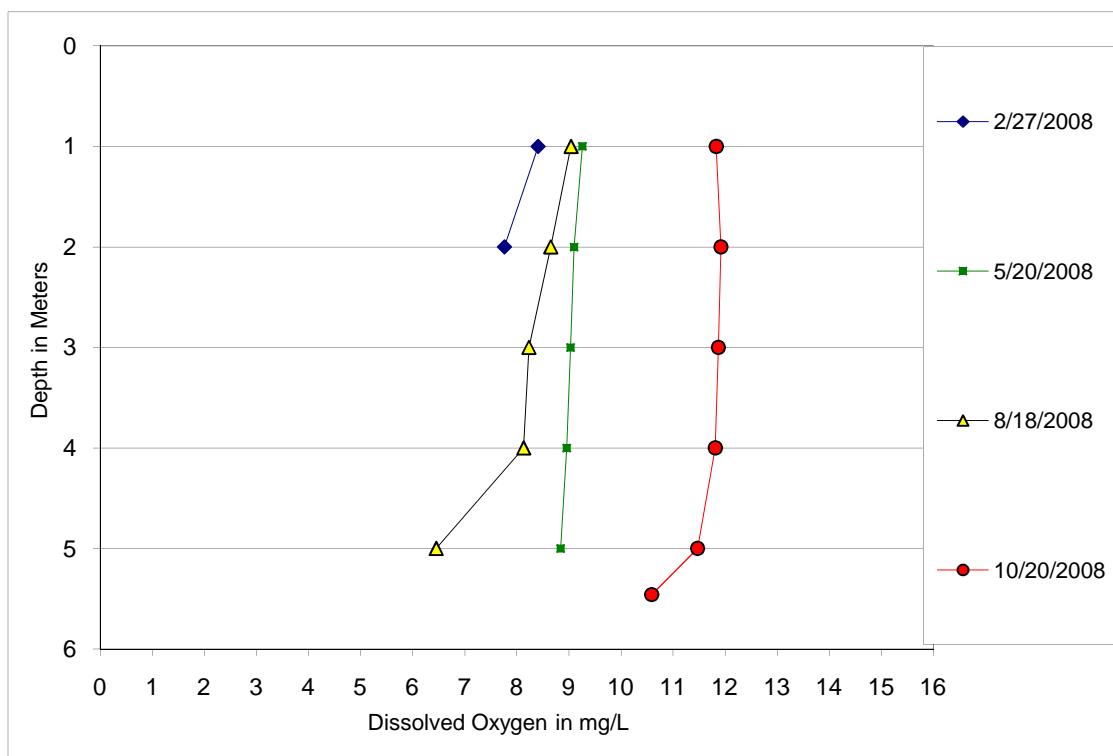


7k. Dissolved Oxygen Profiles for Southwest West Bay.

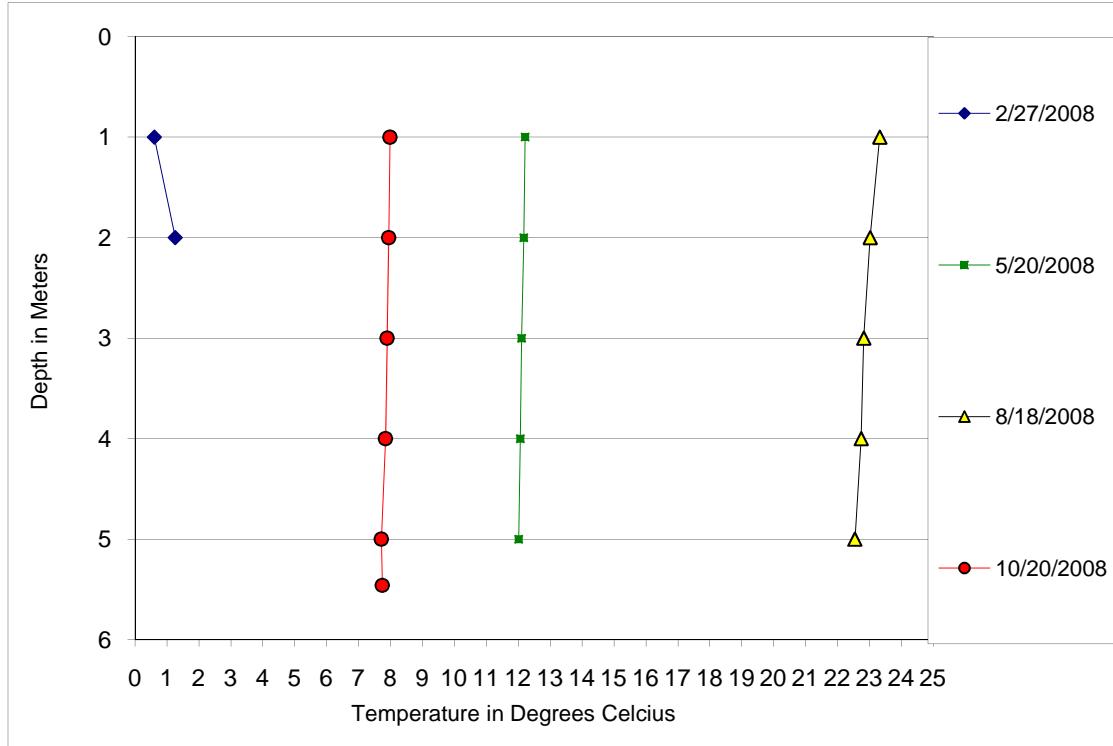


7l. Temperature Profiles for Southwest West Bay.

**Figure 7. Continued.**



7m. Dissolved Oxygen Profiles for Pelican Lake.



7n. Temperature Profiles for Pelican Lake.

**Figure 7. Continued.**

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Appendix A  
Water Quality Results for Devils Lake 1995-2008

# Devils Lake Report

Analyte	Collection	Detect Limit	Depth	380221	380233	380234	380235	380236	384160	385029
<b>Ammonia (N)</b>										
3/15/1995			1	0.258	0.214	0.18	0.39	0.281		
5/15/1995			1	0.055	0.056	0.023	0.035	0.107		
7/25/1995	0.010		1	0.09	0.059		0.033	*ND		
7/27/1995			1			0.18				
10/3/1995	0.010		1	*ND	*ND	*ND	0.041	*ND		
3/25/1996	0.010		1	*ND	*ND	*ND		*ND		
5/20/1996	0.010		1	*ND	*ND	0.016	0.012	0.021		
7/1/1996	0.010		1	*ND	*ND	0.03	0.055	*ND		
8/5/1996	0.010		1	*ND	*ND	*ND	*ND	*ND		
9/3/1996	0.010		1	0.078	*ND	0.03	0.062	*ND		
9/30/1996	0.010		1	0.056	*ND	*ND	0.151	*ND		
3/4/1997			1	0.01	0.051	0.037	0.243	0.121		
5/14/1997	0.010		1	0.061	0.029	*ND	0.042	*ND		
7/8/1997	0.010		1	*ND	*ND	*ND		0.177		
7/16/1997	0.010		1				*ND			
8/4/1997	0.010		1	*ND	*ND	*ND	*ND	*ND	*ND	
9/2/1997	0.010		1	0.035	0.022	0.029	0.088	*ND	0.05	
10/6/1997	0.010		1	*ND	*ND	0.027		*ND	*ND	
5/19/1998			1	0.047	0.156	0.099	0.058	0.167	0.098	
7/6/1998	0.010		1	*ND	*ND	*ND	*ND	*ND	*ND	
8/3/1998	0.010		1	0.085	0.033	0.064	*ND	0.047	0.021	
9/8/1998	0.010		1	*ND	0.022	*ND		0.021	*ND	
10/19/1998	0.010		1	0.081	0.075	*ND		0.038	0.032	
10/21/1998			1				0.174			
2/23/1999			1	0.154	0.104	0.057	0.162	0.095	0.056	
5/25/1999			1	0.175	0.108	0.174	0.068		0.133	0.262
8/2/1999	0.010		1	*ND	*ND	*ND	*ND		*ND	*ND
10/11/1999	0.010		1	*ND	*ND	*ND	*ND		*ND	*ND
2/14/2000			1	0.045	0.041	0.029	0.102		0.017	0.021
5/2/2000	0.010		1	*ND	*ND	*ND	*ND		*ND	0.117
8/1/2000	0.010		1	0.021	*ND	*ND	*ND		*ND	*ND
10/9/2000	0.010		1	*ND	*ND	*ND	*ND		*ND	*ND
3/19/2001			1	0.046	0.03	0.019	0.042	0.046	0.035	0.421
5/14/2001	0.010		1	*ND	*ND	*ND	*ND	*ND	*ND	0.197
8/6/2001			1	0.059	0.039	0.037	0.11	0.052	0.044	0.042
10/10/2001	0.010		1	0.036	0.011	0.03	0.188	*ND	0.013	0.028
2/11/2002	0.010		1	*ND	*ND	*ND	0.119	*ND	*ND	0.075

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	5/13/2002		1	0.046	0.027	0.017	0.051	0.116	0.038	0.021
	8/13/2002	0.010	1	0.013	0.031	*ND	0.011	*ND	*ND	*ND
	10/7/2002	0.010	1	*ND						
	2/10/2003		1	0.098	0.063	0.16	0.323	0.06	0.12	0.327
	5/7/2003		1	0.021	0.013	0.052	0.063	0.022	0.012	0.06
	8/12/2003	0.010	1	*ND	0.079	*ND	0.017	0.042	*ND	*ND
	10/7/2003	0.010	1	*ND	*ND	*ND	0.218	*ND	*ND	*ND
	3/16/2004	0.010	1	*ND	*ND	*ND		*ND	*ND	*ND
	5/18/2004	0.010	1	*ND	*ND	*ND	*ND	*ND	*ND	0.114
	8/10/2004	0.010	1	*ND	*ND	*ND		*ND	*ND	*ND
	10/6/2004	0.010	1	*ND						
	3/8/2005	0.010	1	*ND						
	5/24/2005	0.010	1	*ND	*ND	*ND	0.016	*ND	*ND	0.129
	8/16/2005		1	0.094	0.103	0.062	0.078	0.042	0.024	0.078
	10/11/2005	0.010	1	*ND	*ND	*ND	0.11	*ND	*ND	*ND
	2/14/2006	0.010	1	0.078	0.039	0.024	0.046	0.033	*ND	0.024
	5/9/2006	0.010	1	0.021	0.057	0.013	*ND	*ND	*ND	0.185
	5/9/2006	0.010	2	0.021	0.057	0.013	*ND	*ND	*ND	0.185
	8/15/2006	0.010	1	0.02	0.135	0.037	*ND	*ND	0.021	0.015
	10/9/2006	0.010	1	*ND	*ND	*ND		*ND	*ND	*ND
	2/20/2007	0.010	1	*ND	0.033	*ND	*ND	0.01	*ND	0.031
	5/15/2007		1	0.066	0.079	0.017	0.023	0.028	0.023	0.177
	8/21/2007	0.010	1	0.242	0.028	0.031	0.171	0.022	*ND	*ND
	10/24/2007	0.010	1	0.012	*ND	0.036	0.114	0.033	0.041	*ND
	2/26/2008	0.030	1	0.056	*ND	0.065	0.133	*ND	0.092	0.105
	5/20/2008	0.030	1	*ND	*ND		*ND	0.03	*ND	0.091
	8/18/2008	0.030	1	*ND						
	10/20/2008	0.030	1	*ND						
<b>Chloride</b>										
	3/15/1995		1	62	20.4	330	975	101		
	5/15/1995		1	104	182	379	858	91.5		
	7/25/1995		1	135	165	377	867	76.1		
	10/3/1995		1	151	161	362	840	93.1		
	3/25/1996		1	164	177	207		127		
	5/20/1996		1	110	155	292	741	108		
	7/1/1996		1	97.2	141	321	788	94.8		
	8/5/1996		1	126	123	301	701	96.9		
	9/3/1996		1	137	148	330	816	95.8		
	9/30/1996		1	133	144	289	749	94.9		
	3/4/1997		1	146	150	251	860	131		
	5/14/1997		1	64.6	151	292	903	97.8		

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	7/8/1997		1	112	127	248		79.6		
	7/16/1997		1				742			
	8/4/1997		1	111	129	278	721	85.3	71.6	
	9/2/1997		1	116	137	252	728	92.2	67.9	
	10/6/1997		1	118	136	254		88	82	
	5/19/1998		1	102	137	207	659	89.5	79.3	
	7/6/1998		1	105	122	210	565	89.7	84.4	
	8/3/1998		1	115	119	232	568	98.9	93.4	
	9/8/1998		1	111	125	238		97	99.3	
	10/19/1998		1	120	128	254	606	98.5	95.6	
	2/23/1999		1	130	140	277	631	123	118	
	5/25/1999		1	93.3	121	249	573		85.9	18.6
	8/2/1999		1	108	110	247	555		85.5	25.8
	10/11/1999		1	116	119	252	570		94.7	20.9
	2/14/2000		1	121	125	267	566		107	29.2
	5/2/2000		1	115	118	243	545		97.9	55.8
	8/1/2000		1	122	124	238	539		107	69.7
	10/9/2000		1	125	124	243	520	108	108	73.3
	3/19/2001		1	128	124	199	436	120	121	33.2
	5/14/2001		1	83	126	250	487	115	108	38
	8/6/2001		1	113	117	221	497	109	103	59.1
	10/10/2001		1	121	126	236	526	114	112	59.8
	2/11/2002		1	126	127	226	513	126	124	62.5
	5/13/2002		1	112	107	212	401	110	93.3	63.1
	8/13/2002		1	116	125	219	480	117	115	83
	10/7/2002		1	126	136	212	457	126	125	41.7
	2/10/2003		1	134	140	248	487	138	139	109
	5/7/2003		1	101	122	191	442	123	113	77.8
	8/12/2003		1	130	131	210	433	120	118	92.1
	10/7/2003		1	131	129	211	462	122	120	106
	3/16/2004		1	145	153	200		147	158	131
	5/18/2004		1	106	130	205	398	120	117	73.4
	8/10/2004		1	123	99.7	207		116	120	75.1
	10/6/2004		1	123	131	210	395	120	118	81.3
	3/8/2005		1	126	133	195	389	130	132	94.6
	5/24/2005		1	122	130	195	347	117	125	77.8
	8/16/2005		1	112	126	196	332	115	119	68.6
	10/11/2005		1	121	123	191	309	120	119	71.8
	2/14/2006		1	115	134	175	284	134	133	85.1
	5/9/2006	2	103	115	168	268	268	106	102	46.6
	5/9/2006	1	103	115	168	268	106	102		46.6

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	8/15/2006		1	118	122	186	263	118	114	61.4
	10/9/2006		1	123	122	185		116	112	70.8
	2/20/2007		1	132	134	199	269	131	137	91.3
	5/15/2007		1	119	122	181	250	114	110	75.4
	8/21/2007		1	116	124	184	231	120	117	87.6
	10/24/2007		1	116	119	178	235	116	119	89.5
	2/26/2008		1	131	139	200	260	138	143	122
	5/20/2008		1	125	129		243	308	120	92.9
	8/18/2008		1	130	132	188	232	125	124	109
	10/20/2008		1	130	130	180	229	121	124	107
<b>Chlorophyll A</b>										
	7/25/1995	3.000	0.923	8	13		*ND	21		
	7/27/1995		0.923			23				
	10/3/1995	3.000	0.923	*ND	*ND	*ND	*ND	9		
	5/20/1996	3.000	0.923	16	5	7	15		*ND	
	7/1/1996	3.000	0.923	6	52	*ND	*ND	14		
	8/5/1996		0.923	9	12	22	25		11	
	9/3/1996		0.923	19	16	11	11		6	
	9/30/1996	3.000	0.923	*ND	*ND				11	
	10/2/1996		0.923			5	36			
	5/14/1997	3.000	0.923	23	14	10	*ND	19		
	7/8/1997	3.000	0.923	*ND	*ND	36			6	
	7/16/1997		0.923				4			
	8/4/1997	3.000	0.923	11	7	6	*ND	42	42	
	9/2/1997		0.923	15	9	12	10	19		25
	10/6/1997		0.923	9	10	5		15		42
	5/19/1998	3.000	0.923	6	*ND	*ND	5	*ND		*ND
	7/6/1998	3.000	0.923	18	*ND	11	*ND	7	11	
	8/3/1998		0.923	9	12	16	140	18		21
	9/8/1998	3.000	0.923	13	5			*ND		
	9/10/1998		0.923			18			19	
	10/19/1998	3.000	0.923	*ND	4	29	20	12	20	
	5/25/1999	3.000	0.923	*ND	*ND	*ND	*ND		*ND	*ND
	8/2/1999	3.000	0.923	*ND	16	5	*ND		*ND	9
	10/11/1999	6.000	0.923	16	76	23	56		*ND	28
	5/2/2000	3.000	0.923	8	11	9	24		9	*ND
	8/1/2000		0.923	16	14	12	77		57	78
	10/9/2000		0.923	10	24	19	41	11	17	35
	5/14/2001	6.000	0.923	30	14			*ND	*ND	
	5/15/2001	3.000	0.923			9	20			*ND
	10/10/2001		0.923	14	7	19	8	11	12	

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
		5/13/2002	3.000	0.923	*ND	*ND	8	9	*ND	6
		8/13/2002		0.923	23	15	36	108	27	16
		10/7/2002		0.923	11	9	10	33	18	12
		5/7/2003		0.923	7	6	11	4	7	9
		8/12/2003		0.923	37	4	16	58	8	20
		10/7/2003	6.000	0.923	12.8	15	*ND	16	*ND	5.7
		5/18/2004	3.000	0.923	11.5	9.1	5.3	32.6	*ND	5.6
		8/10/2004		0.923	14.7	6.7	11.9		13.2	20
		10/6/2004		0.923	19.5	16	17.4	59.8	20.3	2.1
		5/24/2005		0.923	3.6	2.7	3.5	4.3	6.5	6.8
		8/16/2005		0.923	10.7	13.1	22.7	20.3	15.5	24.6
		10/11/2005		0.923	26.2	19.8	21.4	6.9	26.3	18.9
		5/9/2006	3.000	0.923	9.3	13.9	11.5	*ND	11.4	5.6
		8/15/2006		0.923	35.2	7.9	14.7	49.3	29.6	25.4
		10/9/2006		0.923	18.7	16.6	27.8		39	40.1
		5/15/2007	2.000	0.923	3.74				11.4	4.63
		5/16/2007	1.500	0.923		*ND	7.3	6.05		
		8/21/2007	1.500	1	5.9	24	41.1	8.8	*ND	64.1
		10/24/2007	3.000	1			*ND		*ND	32
		10/24/2007	1.500	1	*ND	*ND				
		10/24/2007	2.000	1			*ND			
		5/20/2008	3.000	0.923						*ND
		5/20/2008	1.500	0.923	*ND	18.7			4.8	*ND
		5/21/2008		0.923				26.3	13.9	
		8/18/2008		0.923	9.9	14.2	13.4	8.5	18.4	17.9
		10/20/2008		0.923	63	38.2	29.6	19.5	39.5	68.4
					1					49.1
<b>Conductivity</b>										
		3/15/1995	1	1040	3060	4480	11000	2100		
		5/15/1995	1	1800	2830	4780	9900	1700		
		7/25/1995	1	2270	2410	4790	9650	1500		
		10/3/1995	1	2410	2560	4820	9920	1760		
		3/25/1996	1	2660	2730	3140		2100		
		5/20/1996	1	1870	2450	4180	8980	1870		
		7/1/1996	1	1830	2330	4300	9270	1760		
		8/5/1996	1	2060	2280	4130	8950	1720		
		9/3/1996	1	2180	2310	4280	9070	1730		
		9/30/1996	1	2250	2400	4320	9370	1800		
		3/4/1997	1	2490	2540	3670	9820	2360		
		5/14/1997	1	1250	2320	3860	8920	1710		
		7/8/1997	1	1900	2090	3410		1530		
		7/16/1997		1			8380			

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	8/4/1997		1	1840	2050	3350	8210	1540	1360	
	9/2/1997		1	1820	2080	3290	8310	1600	1440	
	10/6/1997		1	1950	2160	3330		1650	1580	
	5/19/1998		1	1890	2130	3150	8020	1740	1620	
	7/6/1998		1	1940	2130	3280	7530	1780	1700	
	8/3/1998		1	1990	2120	3400	7390	1810	1750	
	9/8/1998		1	1960	2100	3390		1860	1790	
	10/19/1998		1	2060	2130	3480	7230	1850	1800	
	2/23/1999		1	2190	2240	3720	7510	2120	2120	
	5/25/1999		1	1670	2000	3100	6750		1600	702
	8/2/1999		1	1900	1920	3310	6720		1640	864
	10/11/1999		1	1930	1970	3350	6710		1730	932
	2/14/2000		1	2080	2110	3580	6810		1940	1310
	5/2/2000		1	2000	2030	3380	6530		1780	1300
	8/1/2000		1	2000	2020	3290	6480		1810	1420
	10/9/2000		1	2120	2130	3360	6610	1930	1960	1250
	3/19/2001		1	2290	2260	3150	5950	2250	2310	1120
	5/14/2001		1	1540	2020	3240	5860	1980	1890	1070
	8/6/2001		1	1960	2010	3170	6000	1930	1880	1290
	10/10/2001		1	2050	2110	3240	6150	2000	1990	1330
	2/11/2002		1	2210	2200	3450	6380	2190	2240	1610
	5/13/2002		1	2080	2130	3200	5890	2000	1960	1520
	8/13/2002		1	2040	2170	3250	5970	2080	2070	1700
	10/7/2002		1	2080	2160	3160	5700	2050	2060	1250
	2/10/2003		1	2250	2300	3430	6010	2310	2360	2070
	5/7/2003		1	1920	2210	3000	5860	2140	2090	1690
	8/12/2003		1	2200	2250	3150	5730	2140	2110	1880
	10/7/2003		1	2250	2290	3160	5740	2170	2180	1930
	3/16/2004		1	2320	2410	2930		2390	2460	2200
	5/18/2004		1	1900	2210	3090	5300	2090	2090	1520
	8/10/2004		1	2090	2140	3010		2070	2050	1540
	10/6/2004		1	2150	2210	3060	5220	2110	2090	1650
	3/8/2005		1	2260	2360	3140	5200	2320	2370	2000
	5/24/2005		1	2140	2190	2970	4550	2090	2100	1660
	8/16/2005		1	1940	2120	2900	4310	2070	2060	1500
	10/11/2005		1	2110	2170	2940	4280	2120	2110	1590
	2/14/2006		1	2100	2270	2750	3880	2260	2340	1840
	5/9/2006		1	2010	2140	2840	3940	2070	2040	1280
	5/9/2006	2	2010	2140	2840	3940	2070	2040	1280	
	8/15/2006		1	2120	2160	2890	3770	2080	2040	1440
	10/9/2006		1	2160	2180	2900		2090	2100	1590

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	2/20/2007		1	2360	2390	3070	3890	2330	2410	1940
	5/15/2007		1	2130	2190	2880	3590	2090	2050	1630
	8/21/2007		1	2080	2160	2800	3500	2100	2090	1740
	10/24/2007		1	2170	2240	2900	3520	2170	2170	1880
	2/26/2008		1	2330	2360	3040	3700	2390	2500	2330
	5/20/2008		1	2200	2230		3430	5020	2160	1910
	8/18/2008		1	2240	2270	2870	3430	2200	2190	1970
	10/20/2008		1	2260	2280	2860	3400	2190	2190	2010
<b>Dissolved Phosphorus as P</b>										
	3/15/1995		1				0.176	0.277		
	7/25/1995		1	0.253	0.222	0.254	0.13	0.188		
	10/3/1995		1	0.197	0.202	0.267	0.179	0.139		
	3/25/1996		1	0.201	0.148	0.173		0.253		
	5/20/1996		1	0.131	0.166	0.193	0.115	0.139		
	7/1/1996		1	0.244	0.193	0.261	0.187	0.206		
	8/5/1996		1	0.24	0.25	0.295	0.179	0.271		
	9/3/1996		1	0.228	0.241	0.233	0.2	0.238		
	9/30/1996		1	0.276	0.258	0.232	0.214	0.124		
	3/4/1997		1	0.282	0.243	0.291	0.261	0.143		
	5/14/1997		1	0.294	0.304	0.216	0.312	0.249		
	7/8/1997		1	0.299	0.242	0.261		0.223		
	7/16/1997		1				0.185			
	8/4/1997		1	0.256	0.229	0.234	0.157	0.295	0.173	
	9/2/1997		1	0.318	0.306	0.254	0.224	0.3	0.238	
	10/6/1997		1	0.26	0.248	0.216		0.218	0.122	
	5/19/1998		1	0.22	0.23	0.223	0.256	0.218	0.206	
	7/6/1998		1	0.194	0.193	0.179	0.272	0.186	0.205	
	8/3/1998		1	0.341	0.276	0.3	0.22	0.352	0.322	
	9/8/1998		1	0.29	0.296	0.29		0.352	0.318	
	10/19/1998		1	0.438	0.262	0.212	0.272	0.229	0.383	
	2/23/1999		1	0.469	0.486	0.413	0.294	0.431	0.404	
	5/25/1999		1	0.265	0.296	0.244	0.317		0.317	0.25
	8/2/1999		1	0.315	0.258	0.3	0.242		0.276	0.334
	10/11/1999		1	0.263	0.244	0.176	0.224		0.161	0.153
	2/14/2000		1	0.156	0.177	0.157	0.338		0.148	0.106
	5/2/2000		1	0.173	0.181	0.16	0.3		0.173	0.205
	8/1/2000		1	0.206	0.249	0.193	0.268		0.221	0.38
	10/9/2000		1	0.254	0.205	0.182	0.32	0.208	0.197	0.233
	3/19/2001		1	0.179	0.155	0.197	0.325	0.181	0.199	0.315
	5/14/2001		1	0.207	0.162	0.165	0.203	0.208	0.194	0.26
	8/6/2001		1	0.27	0.262	0.223	0.231	0.32	0.296	0.337

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	10/10/2001		1	0.292	0.299	0.228	0.328	0.302	0.298	0.058
	2/11/2002		1	0.206	0.237	0.172	0.26	0.21	0.211	0.008
	5/13/2002		1	0.331	0.237	0.194	0.279	0.241	0.227	0.056
	8/13/2002		1	0.298	0.287	0.244	0.257	0.286	0.268	0.256
	10/7/2002		1	0.239	0.245	0.233	0.243	0.235	0.281	0.04
	2/10/2003		1	0.197	0.215	0.23	0.351	0.218	0.194	0.274
	5/7/2003		1	0.186	0.224	0.213		0.224	0.212	0.199
	8/12/2003		1	0.265	0.29	0.224	0.153	0.316	0.258	0.309
	10/7/2003		1	0.278	0.254	0.221	0.175	0.167	0.174	0.193
	3/16/2004		1	0.208	0.169	0.203		0.2	0.18	0.282
	5/18/2004		1	0.176	0.187	0.185	0.146	0.179	0.161	0.233
	8/10/2004		1	0.273	0.302	0.275		0.283	0.254	0.269
	10/6/2004		1	0.248	0.257	0.259	0.26	0.236	0.243	0.149
	3/8/2005		1	0.241	0.225	0.227	0.277	0.251	0.241	0.128
	5/24/2005		1	0.192	0.203	0.188	0.245	0.174	0.18	0.166
	8/16/2005		1	0.306	0.29	0.232	0.237	0.281	0.276	0.233
	10/11/2005		1	0.216	0.225	0.194	0.224	0.249	0.254	0.146
	2/14/2006		1	0.268	0.206	0.209	0.198	0.248	0.2	0.134
	5/9/2006		1	0.244	0.233	0.195	0.216	0.196	0.19	0.228
	5/9/2006	2	0.244	0.233	0.195	0.216	0.196	0.19	0.228	
	8/15/2006		1	0.311	0.302	0.254	0.225	0.265	0.257	0.268
	10/9/2006		1	0.249	0.29	0.229		0.224	0.217	0.117
	2/20/2007		1	0.238	0.234	0.156	0.16	0.176	0.16	0.125
	5/15/2007		1	0.187	0.198	0.163	0.155	0.167	0.138	0.201
	8/21/2007		1	0.285	0.261	0.174	0.234	0.183	0.148	0.277
	10/24/2007		1	0.227	0.212	0.22	0.224	0.157	0.154	0.17
	2/26/2008		1	0.194	0.144	0.232	0.308	0.164	0.193	0.207
	5/20/2008		1	0.178	0.167		0.174	0.335	0.155	0.191
	8/18/2008		1	0.237	0.226	0.195	0.191	0.203	0.177	0.191
	10/20/2008		1	0.159	0.167	0.112	0.14	0.075	0.066	0.028
<b><i>Dissolved Solids(C)-Total</i></b>										
	3/15/1995		1	638	1890	3090	9000	1400		
	5/15/1995		1	1070	1840	3270	7570	1000		
	7/25/1995		1	1440	1880	3410	8120	960		
	10/3/1995		1	1760	1870	3600	8160	1280		
	3/25/1996		1	1890	1790	2260		1350		
	5/20/1996		1	1090	1500	2750	7650	1110		
	7/1/1996		1	1150	1530	3060	7520	1110		
	8/5/1996		1	1290	1450	2910	7300	1110		
	9/3/1996		1	1470	1720	3450	7030	1080		
	9/30/1996		1	1380	1490	2850	6660	1090		

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	3/4/1997		1	1790	1550	2610	8200	1450		
	5/14/1997		1	812	1660	2910	7860	1160		
	7/8/1997		1	1250	1370	2430		981		
	7/16/1997		1				6740			
	8/4/1997		1	1300	1490	2570	6860	1090	944	
	9/2/1997		1	1200	1400	2280	6640	1020	902	
	10/6/1997		1	1300	1440	2350		1080	1010	
	5/19/1998		1	1230	1360	2140	6310	1100	1050	
	7/6/1998		1	1260	1390	2170	5620	1130	1090	
	8/3/1998		1	1290	1340	2240	5500	1150	1110	
	9/8/1998		1	1310	1440	2380		1250	1160	
	10/19/1998		1	1430	1460	2480	5730	1210	1190	
	2/23/1999		1	1480	1490	2750	6080	1490	1450	
	5/25/1999		1	1130	1390	2340	5430		1090	447
	8/2/1999		1	1290	1300	2380	5380		1110	564
	10/11/1999		1	1340	1360	2460	5450		1140	596
	2/14/2000		1	1440	1470	2590	5410		1330	865
	5/2/2000		1	1360	1420	2450	5180		1230	851
	8/1/2000		1	1400	1420	2380	5110		1250	936
	10/9/2000		1	1400	1440	2420	4990	1310	1300	1020
	3/19/2001		1	1540	1500	2180	4540	1470	1510	721
	5/14/2001		1	1050	1440	2350	4590	1380	1310	699
	8/6/2001		1	1360	1410	2240	4700	1340	1290	854
	10/10/2001		1	1430	1480	2420	4930	1370	1350	877
	2/11/2002		1	1540	1520	2400	4800	1530	1540	1030
	5/13/2002		1	1380	1320	2210	4050	1340	1230	945
	8/13/2002		1	1360	1490	2280	4550	1460	1460	1090
	10/7/2002		1	1370	1490	2220	4290	1500	1450	822
	2/10/2003		1	1580	1630	2520	4440	1630	1660	1440
	5/7/2003		1	1240	1440	2010	4170	1420	1360	1060
	8/12/2003		1	1500	1500	2190	4180	1420	1400	1220
	10/7/2003		1	1540	1540	2280	4250	1480	1470	1290
	3/16/2004		1	1660	1710	2190		1690	1770	1580
	5/18/2004		1	1270	1480	2140	3830	1410	1390	992
	8/10/2004		1	1420	1300	2140		1400	1420	1050
	10/6/2004		1	1470	1510	2170	3840	1440	1430	1090
	3/8/2005		1	1530	1590	2170	3830	1570	1590	1350
	5/24/2005		1	1430	1490	2060	3430	1400	1460	1080
	8/16/2005		1	1350	1460	2080	3300	1380	1420	1000
	10/11/2005		1	1430	1460	2050	3130	1440	1430	1050
	2/14/2006		1	1500	1610	1990	2940	1620	1620	1280

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	5/9/2006		2	1350	1460	2030	2930	1380	1360	824
	5/9/2006		1	1350	1460	2030	2930	1380	1360	824
	8/15/2006		1	1440	1460	2000	2710	1420	1410	962
	10/9/2006		1	1470	1420	1930		1440	1360	1020
	2/20/2007		1	1620	1600	2160	2760	1590	1690	1280
	5/15/2007		1	1490	1510	2030	2640	1420	1410	1070
	8/21/2007		1	1380	1460	1940	2450	1440	1440	1180
	10/24/2007		1	1470	1510	2050	2580	1490	1490	1260
	2/26/2008		1	1670	1740	2260	2750	1710	1830	1710
	5/20/2008		1	1470	1500		2420	3440	1450	1230
	8/18/2008		1	1530	1530	1990	2360	1540	1520	1350
	10/20/2008		1	1590	1560	2040	2490	1490	1520	1370
<b>Nitrate + Nitrite (N)</b>										
	3/15/1995		1	0.778	0.593	0.736	0.145	0.171		
	5/15/1995		1	0.13	0.418	0.096	0.034	0.051		
	7/25/1995		1	0.008	0.019	0.014	0.011	0.008		
	10/3/1995	0.005	1	0.087	*ND	0.075	0.01	*ND		
	3/25/1996		1	0.11	0.04	0.07		0.27		
	5/20/1996	0.020	1	*ND	*ND	*ND	*ND	*ND		
	7/1/1996	0.020	1	0.03	*ND	0.03	0.06	0.02		
	8/5/1996	0.020	1	*ND	*ND	*ND	*ND	*ND		
	9/3/1996	0.020	1	*ND	*ND	*ND	*ND	*ND		
	9/30/1996	0.020	1	0.19	0.08			*ND		
	10/2/1996		1			0.04	0.06			
	3/4/1997		1	0.5	0.24	0.33	0.26	0.09		
	5/14/1997	0.020	1	0.29	0.11	*ND	0.51	*ND		
	7/8/1997		1	0.06	0.04	0.02		0.05		
	7/16/1997	0.020	1				*ND			
	8/4/1997	0.020	1	*ND	*ND	*ND	*ND	*ND	*ND	
	9/2/1997		1	0.04	0.03	0.02	0.03	0.05	0.07	
	10/6/1997		1	0.19	0.15	0.1		0.13	0.11	
	5/19/1998		1	0.1	0.08		0.57			
	7/6/1998	0.020	1	*ND	*ND	*ND	0.37	0.04	0.08	
	8/3/1998	0.020	1	0.03	*ND	*ND	*ND	0.03	*ND	
	9/8/1998	0.020	1	*ND	*ND	*ND		0.04	0.03	
	10/19/1998	0.020	1	*ND	0.07	0.02		0.06	0.02	
	10/21/1998		1				0.21			
	2/23/1999	0.020	1	0.3	0.2	0.13	0.46	0.05	*ND	
	5/25/1999		1	0.22	0.13	0.05	0.48		0.11	0.22
	8/2/1999	0.020	1	*ND	*ND	*ND	*ND	*ND	*ND	
	10/11/1999	0.020	1	0.09	*ND	*ND	0.12		*ND	0.26

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	2/14/2000	0.020	1	0.06	*ND	0.02	0.48		*ND	*ND
	5/2/2000	0.020	1	*ND	*ND	0.48			*ND	0.03
	8/1/2000	0.020	1	0.02	*ND	*ND	*ND		*ND	*ND
	10/9/2000		1	0.2	0.04	0.19	0.26	0.09	0.02	0.02
	3/19/2001		1	0.11	0.05	0.27	0.51	0.07	0.09	0.66
	5/14/2001	0.020	1	0.36	*ND	*ND	0.02	0.04	*ND	0.06
	8/6/2001	0.020	1	*ND	*ND	*ND	0.03	*ND	*ND	0.02
	10/10/2001		1	0.07	0.08	0.08	0.08	0.03	0.03	0.09
	2/11/2002		1	0.22	0.19	0.32	0.46	0.14	0.06	0.04
	5/13/2002	0.020	1	0.06	0.07	0.09	0.48	0.06	*ND	0.02
	8/13/2002	0.020	1	0.02	0.04	0.03	0.03	*ND	0.02	0.06
	10/7/2002		1	0.02	0.02	0.15	0.1	0.02	0.07	0.02
	2/10/2003		1	0.03	0.02	0.23	0.31	0.02	0.02	0.11
	5/7/2003	0.020	1	0.02	*ND	0.05	0.48	*ND	*ND	0.04
	8/12/2003	0.020	1	*ND	*ND	*ND	*ND	0.02	*ND	*ND
	10/7/2003		1	0.04	0.04	0.08	0.11	0.02	0.03	0.02
	3/16/2004	0.020	1	0.21	*ND			0.14	0.09	
	3/18/2004		1			0.14				0.35
	5/18/2004		1	0.07	0.02	0.04	0.23	0.05	0.12	0.05
	8/10/2004		1	0.03	0.04	0.02		0.04	0.03	0.02
	10/6/2004	0.020	1	0.02	*ND	0.05	0.06	0.02	0.03	0.02
	3/8/2005		1	0.04	0.02	0.02	0.36	0.02	0.02	0.02
	5/24/2005		1	0.02	0.02	0.02	0.28	0.02	0.03	0.15
	8/16/2005	0.020	1	0.15	0.03	0.02	*ND	0.03	*ND	0.05
	10/11/2005	0.020	1	*ND	*ND	*ND	0.09	0.04	0.02	0.04
	2/14/2006		1	0.07	0.02	0.02	0.08	0.02	0.02	0.05
	5/9/2006	0.020	2	0.17	0.1	0.04	0.27	*ND	*ND	0.09
	5/9/2006	0.020	1	0.17	0.1	0.04	0.27	*ND	*ND	0.09
	8/15/2006	0.020	1	0.02	0.04	0.03	*ND	*ND	*ND	*ND
	10/9/2006	0.020	1	0.12	0.07	*ND		0.04	0.02	0.04
	2/20/2007	0.030	1	0.19	0.14	*ND	*ND	0.04	*ND	0.03
	5/15/2007	0.030	1	*ND	0.04	0.04	*ND	*ND	*ND	0.08
	8/21/2007	0.030	1	0.06	*ND	*ND	*ND	0.05	*ND	*ND
	10/24/2007	0.030	1	0.12	*ND	0.22	0.08	0.07	0.07	0.04
	2/26/2008	0.030	1	0.05	*ND	0.31	0.2	*ND	0.15	0.18
	5/20/2008	0.030	1	*ND	*ND		*ND	0.03	*ND	0.04
	8/18/2008	0.030	1	*ND	*ND	*ND	0.03	*ND	*ND	*ND
	10/20/2008	0.030	1	0.05	*ND	*ND	0.1	*ND	*ND	*ND

<i>Analyte</i>	<i>Collection</i>	<i>Detect Limit</i>	<i>Depth</i>	<i>380221</i>	<i>380233</i>	<i>380234</i>	<i>380235</i>	<i>380236</i>	<i>384160</i>	<i>385029</i>
<i>Nitrogen (Total)</i>										
5/19/1998		1	1.83	1.95		4				
7/6/1998		1	1.5	1.1	1.61	2.83	1.11	1.32		
8/3/1998		1	1.42	1.33	1.8	3.12	1.59	1.55		
9/8/1998		1	1.35	1.54	2.25		1.44	1.4		
10/19/1998		1	1.52	1.53	1.8	2.98	1.21	1.14		
2/23/1999		1	1.81	1.59	2.1	3.62	1.43	1.51		
5/25/1999		1	1.67	1.6	1.94	3.14		2.02	1.5	
8/2/1999		1	1.34	1.18	1.49	2.3		1.26	1.05	
10/11/1999		1	1.23	1.18	1.53	2.87		1.12	1.4	
2/14/2000		1	1.49	1.37	1.98	3.31		1.46	2.3	
5/2/2000		1	1.4	1.3	1.93	3.3		1.41	1.64	
8/1/2000		1	1.71	1.52	2.01	3.02		1.98	2.35	
10/9/2000		1	1.61	1.42	2.17	4.02	1.58	1.52	1.64	
3/19/2001		1	1.66	1.51	2.12	3.34	1.69	2.01	2.54	
5/14/2001		1	1.7	1.45	1.95	2.46	1.47	1.51	1.56	
8/6/2001		1	2.09	1.97	2.48	3.74	1.8	2.17	2.55	
10/10/2001		1	1.54	1.52	1.88	2.76	1.54	1.59	1.53	
2/11/2002		1	1.83	1.46	2.38	4.45	1.47	1.49	1.93	
5/13/2002		1	1.38	1.37	1.8	2.84	1.53	1.53	1.48	
8/13/2002		1	1.09	1.35	1.61	2.42	1.09	1.02	1.23	
10/7/2002		1	1.39	1.25	1.87	2.42	1.27	1.25	1.08	
2/10/2003		1	1.57	1.65	2.13	3.19	1.64	1.77	2.08	
5/7/2003		1	1.44	1.48	1.99	3.17	1.6	1.59	1.7	
8/12/2003		1	1.58	1.55	1.97	2.99	1.46	1.77	1.39	
10/7/2003		1	1.61	1.61	1.73	3.02	1.43	1.5	1.85	
3/16/2004		1	1.6	1.42	1.69		1.46	1.62	1.98	
5/18/2004		1	1.34	1.38	1.77	2.5	1.34	1.84	1.72	
8/10/2004		1	1.8	1.61	1.97		1.71	1.73	2.05	
10/6/2004		1	1.34	1.32	1.56	2.31	1.34	1.35	1.44	
3/8/2005		1	1.62	1.44	1.72	2.56	1.72	1.67	2.13	
5/24/2005		1	1.38	1.37	1.56	2.24	1.39	1.22	1.82	
8/16/2005		1	1.29	1.47	1.6	1.86	1.36	1.29	1.69	
10/11/2005		1	1.34	1.43	1.53	2.1	1.63	1.39	1.44	
2/14/2006		1	1.63	1.55	1.59	1.98	1.5	1.69	1.9	
5/9/2006		1	1.55	1.44	1.54	1.95	1.48	1.58	1.59	
5/9/2006		2	1.55	1.44	1.54	1.95	1.48	1.58	1.59	
8/15/2006		1	1.43	1.6	1.43	1.74	1.6	1.68	1.66	
10/9/2006		1	1.58	1.67	1.7		1.58	1.6	1.6	
2/20/2007		1	1.93	1.58	1.89	2.09	1.63	1.84	2.04	
5/15/2007		1	1.53	1.6	1.56	1.83	1.5	1.46	1.71	
8/21/2007		1	1.75	1.34	1.49	1.85	1.5	1.46	1.79	
10/24/2007		1	1.48	1.38	1.73	2.09	1.46	1.43	1.59	
2/26/2008		1	1.61	1.43	1.95	2.02	1.59	1.96	2.16	

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	5/20/2008		1	1.51	1.56		1.88	3.34	1.53	1.72
	8/18/2008		1	1.57	1.52	1.72	1.8	1.59	1.89	1.56
	10/20/2008		1	2.01	1.75	1.87	1.97	2.23	2.02	2.03
<b>Phosphorus (Total) (P)</b>										
	3/15/1995		1	0.136	0.225	0.253	0.2	0.306		
	5/15/1995		1	0.125	0.178	0.191	0.176	0.101		
	7/25/1995		1	0.298	0.232	0.269	0.148	0.215		
	10/3/1995		1	0.216	0.226	0.297	0.213	0.169		
	3/25/1996		1	0.19	0.151	0.172		0.269		
	5/20/1996		1	0.174	0.195	0.243	0.181	0.176		
	7/1/1996		1	0.27	0.217	0.298	0.216	0.239		
	8/5/1996		1	0.266	0.257	0.286	0.214	0.27		
	9/3/1996		1	0.247	0.262	0.34	0.232	0.281		
	9/30/1996		1	0.296	0.268	0.29	0.351	0.164		
	3/4/1997		1	0.303	0.244	0.32	0.276	0.158		
	5/14/1997		1	0.286	0.281	0.257	0.284	0.228		
	7/8/1997		1	0.315	0.303	0.309		0.253		
	7/16/1997		1				0.223			
	8/4/1997		1	0.315	0.223	0.219	0.186	0.381	0.269	
	9/2/1997		1	0.354	0.332	0.277	0.255	0.314	0.262	
	10/6/1997		1	0.31	0.312	0.281		0.248	0.191	
	5/19/1998		1	0.926	0.948		0.266			
	7/6/1998		1	0.417	0.359	0.276	0.361	0.449	0.404	
	8/3/1998		1	0.824	0.717	0.265	0.326	0.77	0.851	
	9/8/1998		1	0.412	0.352	0.459		0.482	0.485	
	10/19/1998		1	0.409	0.368	0.292	0.325	0.39	0.278	
	2/23/1999		1	0.398	0.488	0.318	0.336	0.316	0.298	
	5/25/1999		1	0.442	0.475	0.278	0.537		0.492	0.261
	8/2/1999		1	0.355	0.296	0.289	0.283		0.315	0.374
	10/11/1999		1	0.234	0.212	0.186	0.259		0.178	0.189
	2/14/2000		1	0.186	0.182	0.151	0.34		0.162	0.195
	5/2/2000		1	0.219	0.2	0.209	0.42		0.221	0.242
	8/1/2000		1	0.239	0.277	0.226	0.31		0.298	0.54
	10/9/2000		1	0.278	0.241	0.226	0.365	0.255	0.242	0.29
	3/19/2001		1	0.214	0.176	0.22	0.344	0.205	0.236	0.397
	5/14/2001		1	0.261	0.21	0.233	0.231	0.253	0.238	0.282
	8/6/2001		1	0.318	0.323	0.267	0.705	0.36	0.346	0.45
	10/10/2001		1	0.318	0.311	0.248	0.335	0.336	0.328	0.07
	2/11/2002		1	0.248	0.236	0.2	0.304	0.236	0.231	0.024
	5/13/2002		1	0.247	0.245	0.234	0.324	0.276	0.261	0.114
	8/13/2002		1	0.3	0.309	0.254	0.298	0.307	0.273	0.308

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	10/7/2002		1	0.254	0.27	0.248	0.284	0.264	0.27	0.094
	2/10/2003		1	0.224	0.235	0.272	0.397	0.243	0.248	0.318
	5/7/2003		1	0.212	0.248	0.247	0.343	0.253	0.251	0.238
	8/12/2003		1	0.307	0.311	0.27	0.203	0.333	0.358	0.364
	10/7/2003		1	0.273	0.281	0.23	0.223	0.19	0.207	0.25
	3/16/2004		1	0.234	0.206	0.221		0.212	0.209	0.312
	5/18/2004		1	0.236	0.236	0.235	0.182	0.217	0.228	0.267
	8/10/2004		1	0.296	0.309	0.291		0.309	0.288	0.324
	10/6/2004		1	0.275	0.292	0.255	0.293	0.268	0.281	0.187
	3/8/2005		1	0.265	0.28	0.273	0.323	0.269	0.254	0.2
	5/24/2005		1	0.21	0.217	0.211	0.279	0.192	0.203	0.187
	8/16/2005		1	0.335	0.333	0.257	0.272	0.313	0.31	0.273
	10/11/2005		1	0.246	0.257	0.223	0.249	0.313	0.288	0.181
	2/14/2006		1	0.272	0.247	0.224	0.224	0.226	0.256	0.193
	5/9/2006		1	0.286	0.277	0.228	0.254	0.243	0.256	0.269
	5/9/2006		2	0.286	0.277	0.228	0.254	0.243	0.256	0.269
	8/15/2006		1	0.335	0.336	0.259	0.247	0.299	0.302	0.315
	10/9/2006		1	0.283	0.31	0.246		0.27	0.264	0.172
	2/20/2007		1	0.248	0.237	0.166	0.177	0.204	0.178	0.125
	5/15/2007		1	0.222	0.225	0.19	0.186	0.212	0.169	0.234
	8/21/2007		1	0.305	0.269	0.203	0.242	0.203	0.179	0.341
	10/24/2007		1	0.247	0.231	0.233	0.242	0.18	0.177	0.218
	2/26/2008		1	0.214	0.164	0.256	0.236	0.185	0.216	0.238
	5/20/2008		1	0.217	0.206		0.212	0.427	0.192	0.231
	8/18/2008		1	0.258	0.249	0.214	0.216	0.231	0.216	0.188
	10/20/2008		1	0.236	0.235	0.2	0.199	0.175	0.188	0.126
<b>Sulfate as (SO4)</b>										
	3/15/1995		1	288	1020	1590	4850	554		
	5/15/1995		1	461	870	1580	3770	397		
	7/25/1995		1	697	930	1780	4280	423		
	10/3/1995		1	859	882	1700	4230	600		
	3/25/1996		1	950	757	1140		562		
	5/20/1996		1	458	643	1300	4120	465		
	7/1/1996		1	525	725	1570	4120	474		
	8/5/1996		1	547	648	1440	3970	452		
	9/3/1996		1	692	773	1710	3760	448		
	9/30/1996		1	565	643	1370	3480	443		
	3/4/1997		1	777	686	1170	4460	626		
	5/14/1997		1	348	780	1500	4200	504		
	7/8/1997		1	569	642	1180		427		
	7/16/1997		1				3640			

<b>Analyte</b>	<b>Collection</b>	<b>Detect Limit</b>	<b>Depth</b>	<b>380221</b>	<b>380233</b>	<b>380234</b>	<b>380235</b>	<b>380236</b>	<b>384160</b>	<b>385029</b>
	8/4/1997		1	574	662	1200	3580	467	386	
	9/2/1997		1	540	632	1110	3510	440	382	
	10/6/1997		1	581	655	1130		468	424	
	5/19/1998		1	546	596	999	3270	477	440	
	7/6/1998		1	545	599	993	2790	470	447	
	8/3/1998		1	585	597	1090	2780	511	486	
	9/8/1998		1	583	632	1150		524	495	
	10/19/1998		1	622	652	1230	2950	529	516	
	2/23/1999		1	663	674	1310	3080	622	595	
	5/25/1999		1	490	607	1120	2760		449	155
	8/2/1999		1	553	562	1110	2690		452	195
	10/11/1999		1	589	605	1180	2780		485	219
	2/14/2000		1	622	636	1220	2710		560	321
	5/2/2000		1	614	644	1200	2740		539	338
	8/1/2000		1	611	629	1140	2640		540	385
	10/9/2000		1	617	627	1130	2530	561	554	404
	3/19/2001		1	662	635	971	2210	627	632	283
	5/14/2001		1	463	663	1150	2400	610	577	282
	8/6/2001		1	600	627	1090	2390	582	554	350
	10/10/2001		1	628	655	1150	2480	599	591	354
	2/11/2002		1	671	683	1120	2480	687	682	415
	5/13/2002		1	582	552	1040	1920	579	492	357
	8/13/2002		1	635	663	1120	2330	634	632	473
	10/7/2002		1	622	660	1060	2220	632	611	336
	2/10/2003		1	728	744	1220	2220	735	745	620
	5/7/2003		1	518	610	901	2110	611	572	422
	8/12/2003		1	656	658	1010	2130	613	608	498
	10/7/2003		1	695	679	1070	2260	657	636	555
	3/16/2004		1	730	764	967		740	783	680
	5/18/2004		1	562	654	984	1900	620	599	419
	8/10/2004		1	636	515	1010		607	628	431
	10/6/2004		1	639	673	1030	1910	633	625	453
	3/8/2005		1	663	683	980	1910	675	688	564
	5/24/2005		1	633	663	969	1710	612	611	460
	8/16/2005		1	595	650	979	1660	595	626	424
	10/11/2005		1	621	648	959	1580	618	625	451
	2/14/2006		1	641	691	880	1390	701	703	537
	5/9/2006	2	605	667	963		1470	626	605	339
	5/9/2006	1	605	667	963		1470	626	605	339
	8/15/2006	1	619	633	907		1280	610	604	397
	10/9/2006	1	645	637	928			619	612	444

<i>Analyte</i>	<i>Collection</i>	<i>Detect Limit</i>	<i>Depth</i>	<i>380221</i>	<i>380233</i>	<i>380234</i>	<i>380235</i>	<i>380236</i>	<i>384160</i>	<i>385029</i>
	2/20/2007		1	723	723	1030	1330	720	755	539
	5/15/2007		1	646	654	928	1240	621	604	436
	8/21/2007		1	604	635	884	1130	638	615	493
	10/24/2007		1	628	638	906	1170	632	644	531
	2/26/2008		1	719	747	1020	1270	752	792	727
	5/20/2008		1	657	670		1140	1553	636	531
	8/18/2008		1	690	704	956	1150	670	671	580
	10/20/2008		1	684	683	915	1150	653	670	595